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FOR
THE INDIAN OCEAN,
ARABIAN SEA AND BAY OF BENGAL.

NEW HANDBOOK
FOR
THE INDIAN OCEAN,
ARABIAN SEA AND BAY OF BENGAL.

WITH

MISCELLANEOUS SUBJECTS FOR SAIL AND STEAM,
MAURITIUS CYCLONES AND CURRENTS,
MOON OBSERVATIONS

AND

SAIL-MAKING.

BY

C. W. BREBNER,
LATE MASTER, EX CHINA TEA CLIPPER "SIR LANCELOT,"
MAURITIUS.

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Bombay:
PRINTED AT THE "TIMES OF INDIA" PRESS.

1898.

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I STARTED to compile this work with the sole object of my actual experience being of service to those who have not navigated the Indian Ocean the number of years I have done.

For the past fifteen years I have carefully studied the various phenomena which precede, accompany, and follow Cyclones and Currents, and should my experiences during these dreadful revolving storms, so destructive to life and property, be the means of assisting my colleagues to meet them well prepared, and bring their ships safely through ; or better still, assist them to avoid them, for, when in the latitude of Cyclones, they may often be avoided by carefully watching the barometer and those appearances of sky and water which foretell unsettled weather—and too great attention cannot be given to these subjects during the Cyclone months of December, January, February, March and April, and in the Bay of Bengal during the months of April and May and again from October to December—my labours will be well rewarded.

The Barque "Grosvenor," which I command, is still trading direct between Bombay and Mauritius, averaging about four voyages yearly, so I have not been able to correct any little errors which may have crept into this work while in the press.

Hoping my brother seamen will receive this work as the humble endeavour of one of themselves and that they may find the same useful in navigating the Indian seas, is the sincere wish of

C. W. BREBNER.

"Captain C. W. Brebner, M.M.S.A., is still keeping the name of the old ship 'Sir Lancelot' to the front. The *Mauritius Merchant and Planter's Gazette* says:—'On board the "Sir Lancelot," 30th December, 1892.—Upon invitations issued by Captain Brebner, His Excellency the Governor, the Colonial Secretary, the Receiver-General, the Auditor-General, the Collector of Customs, and several other gentlemen visited to-day the "Sir Lancelot." A most hearty welcome was accorded on board to the visitors, and Captain Brebner was warmly congratulated by the Governor upon the splendid condition of his vessel.'"

From "*Mercantile Marine Association Reporter*, 1893."

PREFACE.

As time rolls on, circumstances change, and the arguments of one year often grow obsolete before another has closed. Many events have presented themselves to us who live within the Tropic of Capricorn from the early nineties to the present which deserve to be chronicled—some of a most disastrous nature, others vexatious. Those dealt with here are the most important and may be of service to navigators in general.

The Bubonic Plague in India brought many changes. Shipping interests between Mauritius, Réunion and India were stretched to almost breaking point through the much-vexed question of quarantine. The exhaustive judgments delivered by three Judges of the Supreme Court of Mauritius cannot but interest merchants, ship-owners and masters, and may also serve as a guide to other British possessions and foreign countries that traffic in drastic quarantine measures.

The wreck of the British transport "Warren Hastings" and an account of the locality will be worthy of the navigator's serious attention. To connect ideas on these subjects recourse was made to such papers as the *Times of India*, *Advocate of India*, *Nautical Magazine*, *Fairplay* and the *Merchants and Commercial Gazette* of Mauritius.

The sailing directions have been condensed from various authors: Findlay, Moriarty, Marshall, and also Hydrographical Notices and Surveys conducted by the officers of the Marine Survey of India. My own sea experience added. Only important ports are enumerated, as sailing vessels have ceased to call at most of the minor ports on the East and West coasts of India.

The Archives of Mauritius supplied some valuable information. The illustrations have been reproduced and photographed by me. The portion that treats on cyclones should form an object of special study on the part of the navigator. Meteorological data and late cyclones are not sufficiently represented. In 1890 the Meteorological Reporter to the Government of India published a "Handbook on Bay of Bengal Cyclones," I consider it a great boon to those who have to navigate the Bay. Through my representations Dr. Meldrum, our late Director of the Observatory, was on the eve of compiling a similar one for our cyclone region ; but due, unfortunately, to severe illness he had to retire from public life and leave the colony. Having a certain amount of data—and humble though my labours be—I have endeavoured to supply this desideratum. To fill up a particular gap I had recourse to the work of Capitaine Bridet, late Director of the Réunion Observatory. His computed tables (translated) of the fall of the barometer and distances from a storm's centre will be of great use to the navigator.

Other portions are from my own experience extending over fifteen years in these seas, which I commit to the kind keeping of those of the nautical profession.

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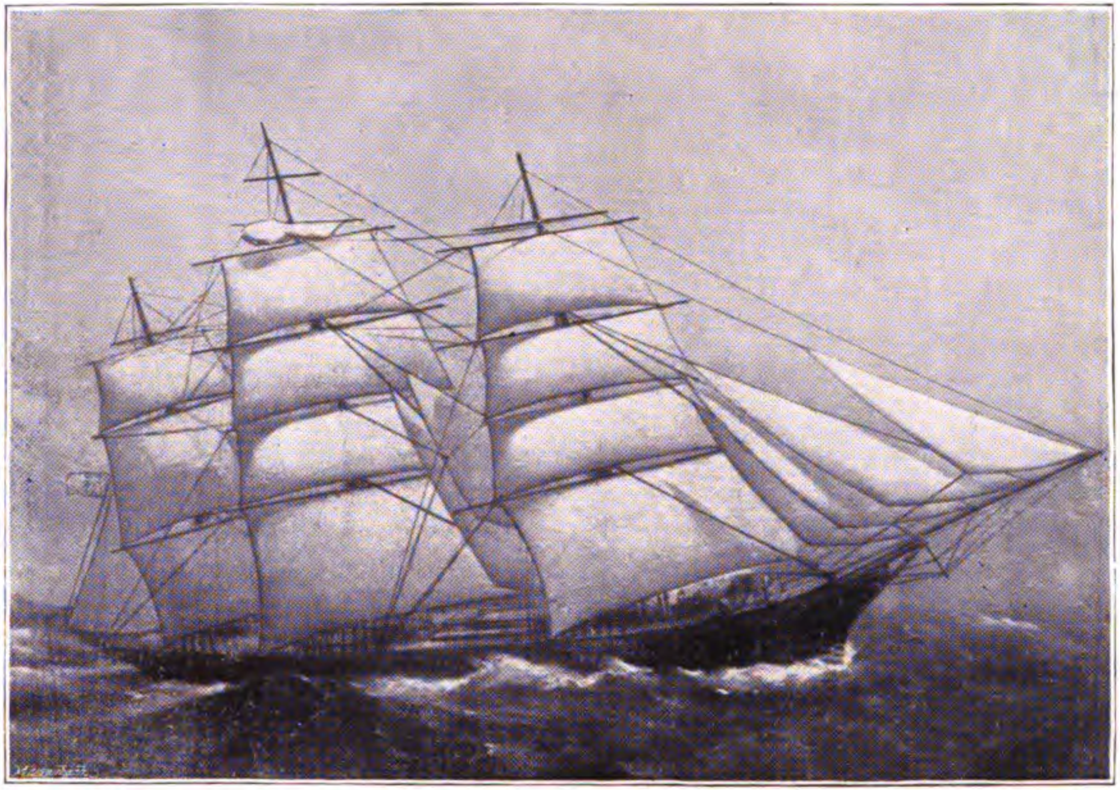

CHINA TEA CLIPPER "SIR LANCELOT" IN RACING TRIM.

[PHOTO. BY THE AUTHOR.

MAURITIUS:

BRITISH KEY OF THE INDIAN OCEAN.

CHAPTER I.

THE history of Mauritius is extremely interesting, and is briefly as follows :—

The Island of Mauritius was discovered in the first half of the sixteenth century by the Portuguese. In 1510 it was named Cerné by Don Pedro Mascarenhas, who believed it to be the Cerna Ethiopia of Pliny. It afterwards became a Spanish possession. In 1599 the Belgic subjects of Spain threw off their much-hated yoke, and Admiral Houtman took possession, landing at Grand Port. The Island was then named Mauritius in honour of Count Maurice of Nassau. It appears to have been settled in 1644, but abandoned early in the following century. The French having occupied Reunion in 1657 occasionally sent settlers to Mauritius; and in 1721 they took formal possession of it, naming it the Isle of France, in after years the home of Paul and Virginia. François Mahe de Labourdonnais assumed the administration of the Island in 1735. He was born at St. Malo in 1699; he was also a merchant and a warrior. He began to navigate at the age of ten, and made several voyages in the Indian Ocean.

Entrusted in the early part of his life with the management of the French East India Company, he was very useful to it in increasing the wealth of that Company and his own at the same time. The King appointed him Governor of the Isles of France and Bourbon, and both islands flourished under his administration. It was during the unfortunate war of 1741. The British were then governing India. A British squadron cruised everywhere in these seas, and were making many captures. Labourdonnais armed a fleet and left Mauritius with nine men-of-war. He met and attacked the British squadron, which he routed, and placed Madras in a state of siege. That town surrendered in September 1746. The conquered paid a ransom of about nine millions. In acting as he did, Labourdonnais only followed the instructions of the French Ministers, which were that he was not to keep any conquest made on shore. Notwithstanding this, the wealth he had acquired excited envy. He was represented—he, the conqueror of Madras—as a prevaricator who had demanded too small a ransom, and like one who had allowed himself to be bribed. A complaint was lodged against him by the Directors of the French East India Company and several shareholders, and, on his arriving in France, Labourdonnais was sent to the Bastille. His trial lasted three years and a half. The Judges having found him innocent, he was discharged and reinstated in all his honours. He died soon after in 1754. It was also during M. Labourdonnais' administration that in August 1744, near Ile d'Ambre, the "St. Geran" was totally wrecked.

The wreck of the "St. Geran," under the command of Captain De la Marre, is perfectly correct; but let us say, in fairness, that the characters of Paul and Virginia never existed.

Under M. Labourdonnais' administration several important measures were realized, such as the supplying of Port Louis with pure water from Grand

River N. W. and the construction of barracks for soldiers. He caused civil and military hospitals to be erected, storehouses, and dockyards, where he had men-of-war built in order that he might proceed to Madras to capture that town, which took place.

The administration of Mauritius was for twelve years in the powerful hands of Labourdonnais—from 1735 to 1747. No comparison can be made between him and the other French Governors respecting the useful works which he ordered to be performed in Mauritius, as well as for the pains he took to ensure the prosperity of the Island. M. Labourdonnais is considered as the founder of the colony. Through his zeal and sagacity he extended the culture of various staples, the principal of which is the sugarcane, which forms, at the end of this nineteenth century, the staple product of this most interesting British colony in the Southern Indian Ocean.

An imposing bronze statue of this great man stands opposite the principal landing-place of Port Louis. It was erected by his grateful countrymen. The square bears his name, having the Oriental Hotel on the east side and a large block of buildings on the west. Up to 29th April 1892 it was surrounded by giant palm trees, and an avenue of the same leading up to Government House, where stands another bronze statue of a former English Governor of the colony, Sir William Stevenson, K.C.B., who was born in Jamaica in 1805, and died in Mauritius on the 2nd January 1863.

When Port Louis was devastated by the great and memorable cyclone of 1892, these magnificent palm trees were all injured and had to be cut down, and the aspect of this avenue of avennes is changed for ever.

The Island was afterwards taken by a British squadron in 1810, and named Mauritius. On the 30th November of that year the British troops landed at Mapou. The forces numbered more than 24,000 men. The fleet consisted of twenty men-of-war under the command of Vice-Admiral Bertie, and also of more than fifty ships of the Company and a number of troopships.

The first division, under the command of Major-General Warde, reached Mapou without any difficulty, and before night 10,000 men landed with their artillery, ammunition, and a supply of food for three days. During the landing of these troops the fleet was divided into three divisions. The first blockaded Port Napoleon (now Port Louis), the second remained to protect the ships at the anchorage, and the third, under the immediate orders of Vice-Admiral Bertie, was to take position where circumstances might require.

As soon as the 10,000 men had landed, they went on their march and travelled for several miles without meeting with the least obstacle. The first skirmish took place with the advance guard, commanded by Lieutenant-Colonel Keating, at Grand Bay, which was watched over by only a few men, who were easily routed. The army proceeded on its march with the firm intention of stopping in town only. The following day (1st December) the troops were so much fatigued that the General was obliged to make a halt at Powder Mill. At about 2 p.m., General Decaen, with a staff numbering about 100 men, went to reconnoitre the English army. He was pursued by the light infantry of the 12th and 59th regiments, which did not succeed in capturing him.

A brigade of the English army, under the command of Lieutenant-Colonel McLeod, seized Grand Bay and established communications with the fleet. The same day the English army, divided in columns, marched to the town by the main road; but shortly after reaching the skirt of a forest on Powder Mill road, it was stopped on its march by a well-sustained fire from a detachment of the National Guards under the command of General Vandermasen. The General, seeing that he was in presence of forces superior to his, retreated towards the ramparts of the town. The English army, meeting with no further obstacle, hastened to the plain at the foot of Long Mountain and took possession. On that very day was signalled the Cape Division, which landed without difficulty a reinforcement at Petite Rivière. Great was the uneasiness in town, for an attack was momentarily expected. In presence of such considerable forces, General Decaen thought that to resist was useless: he sent a flag of truce to General Abercrombie, offering to capitulate. It was then agreed to consider the proposals, and Commodore Rowley and a Major-General were selected by the English Commander-in-Chief and Commander Dreperré and General Vandermasen by General Decaen. They met at the head-quarters of the English General, and, after discussion, the capitulation was agreed to and signed on the 3rd December 1810, at 3 o'clock in the morning, and Mauritius became a British colony.

The Roman Catholic religion and the French language and laws have been preserved under British rule ever since. The geographical position of the Island is between latitude 19° 58′ and 20° 32′ south, longitude 57° 18′ and 57° 49′ east, comprising an area of 705 square miles. It is of a mountainous character, and its scenery picturesque and romantic. Peter Both Mountain, over Port Louis, is estimated at about 2,874 feet above sea-level. Viewed from certain positions, it appears curiously shaped at the summit, having the outline of a figure of a member of one of the learned professions in full flowing robe. Its first ascent was attempted by Claude Peuthié, who was a cutler and a native of the whereabouts of Auxonne in Burgundy; his father was a rich farmer. Claude, when he arrived in Mauritius in 1790, was between 31 and 32 years of age. It was on the 8th September of the same year that he made a rash bet with some boon companions to ascend Peter Both. The following is the history of the enterprise found in the archives of the Isle of France of 1818:—

First ascent of Peter Both.

*"He began to climb up the mountain at 8 o'clock in the morning. He carried on his back a pole 10 feet long, at one of the ends of which was affixed an iron hook, and a wallet containing one loaf of bread, two citrons, 60 fathoms of line, 36 fathoms of 1½ inch rope, two mason's chisels, one hatchet, two piercers, a few nails, and thread and needles. It was not without having experienced much difficulty that he reached the *collet*. He had to climb up a very narrow edge of little inclination, and offering both at the right and left hand sides but an immense precipice. Having reached the *collet* he found there a glacis going round the block, but only 12 feet wide from north to west, and having but one of two feet in the direction of the wind. The rock, being about 30 feet high above the *collet*, formed over his head an enormous prominence, resultant from its form an inverted cone. He hoped that he would have been able to slide by some fissures of the rock, but there was none. Another person would have gone back in presence of such an obstacle. Claude Peuthié did not feel frightened at the idea of suspending himself by a rope over the abyss in order to place himself on the upper surface of the rock. He had observed that one of the angles of that surface was a little higher than the rest. Provided with a bow he shot an arrow, the head of which was armed with a gun bullet, and to the other end of which was fastened a strong line. After many fruitless attempts he succeeded in making his arrow pass over that prominent angle, and after going down to the height of the *collet*. and as, owing to the prominence, it was hanging at some distance from him, he brought it back to him with bamboo

---

* Ascent of Peter Both translated from French manuscript.

poles adapted the one to the other. When he had caught hold of his arrow, he made use of the line to have his larger rope sent over the rock, and the latter rope was used to establish another strong enough to support the weight of his body. He strongly tied it up at one end to the rocks and shrubs on the *collet* in such a manner as to be able to untie it as soon as he would have reached the top. It was then that he resolved to climb up the length of that rope, having but the strength of his arms to guard himself against a fall of 2,500 feet. He fearlessly reached as far as the cornice, but not without being already worn out with fatigue. There his life was in the greatest danger. The rope was stuck against the vertical side of the cornice in a length of more than three feet, and the weight of his body contributed to render that obstacle nearly insuperable. Vainly he tried to seize that part of the rope, his hand could not go round it. Going down again was alike impossible. The prominence, from the place he had reached, was such that coming back again to the extremity of the rope, he would have been laterally kept very far from the *collet* by several feet and hanged over the abyss, in which he would unavoidably have fallen. In such alarming situation he felt that the only chance he had of escaping was to be doubly courageous, and to allow his arms a short rest if that was possible. He seized the rope with his teeth, and, after remaining for a while in this position, he rose up, by means of his hands and feet, as nearly as he could to the point where the rope was stuck against the rock, and there, keeping himself up very strongly by his left hand, he succeeded in catching hold with the right one the rope above the cornice. That last effort was for him a success beyond his expectations. Claude Peuthié then stood upon the Peter Both. After taking a little rest, which was a great necessity to him, and fully rejoicing at the success of his enterprise, he untied the rope, which he afterwards fastened to the shrubs and rocks on the top, and placed it at a point vertically situated over the *collet*. He then immediately came down again and took to the platform of the rock his tools and a French flag attached to a pole 10 feet long. To have his flag planted on the top, he was obliged to dig the rock by means of a chisel and a hammer ; at last with great difficulty he hoisted his flag, which several persons distinctly saw."

Since this interesting event many persons have ascended this famous peak. In the early sixties a naval officer planted the white ensign on its summit. This same officer was Admiral of the East Indian Squadron in 1893, when Peter Both was again ascended by a party of officers from H. M. S. "Cossack." The white ensign was seen for some days floating majestically in the breeze until it blew to pieces.

A local mountaineer kindly contributes the following :—

" The route runs from St. Pierre Railway station to ' La Laura Sugar' Estate, which lies at the foot of the mountain. The ascent for some 1,200 feet is distinctly stiff as to incline; but everything up to the glacis is quite easy, as you merely follow the gully up to that point. At the glacis you turn to the right, and, with grass for grip-hold, bound across the hillside to the right shoulder. Here it would be well to take breath (take off your boots), and look at your work which lies almost perpendicular. Swing along the fairly narrow ridge for some forty paces, and you reach ladder rock. This is perpendicular to a height of 34 feet. Iron rings are embedded in the rock at distances of two feet apart. An abrupt incline now brings you to the saddle, which is only about 10 feet long, but it is too narrow to dance upon, as you can straddle it easily, with a sheer fall of a few hundred feet on one side and over a 1,000 feet on the other. The aggravating thing about the saddle is that the rock is rotten and gives way. (Note.—Don't play the larriken there, but walk the plank like a man.) Once across you have small

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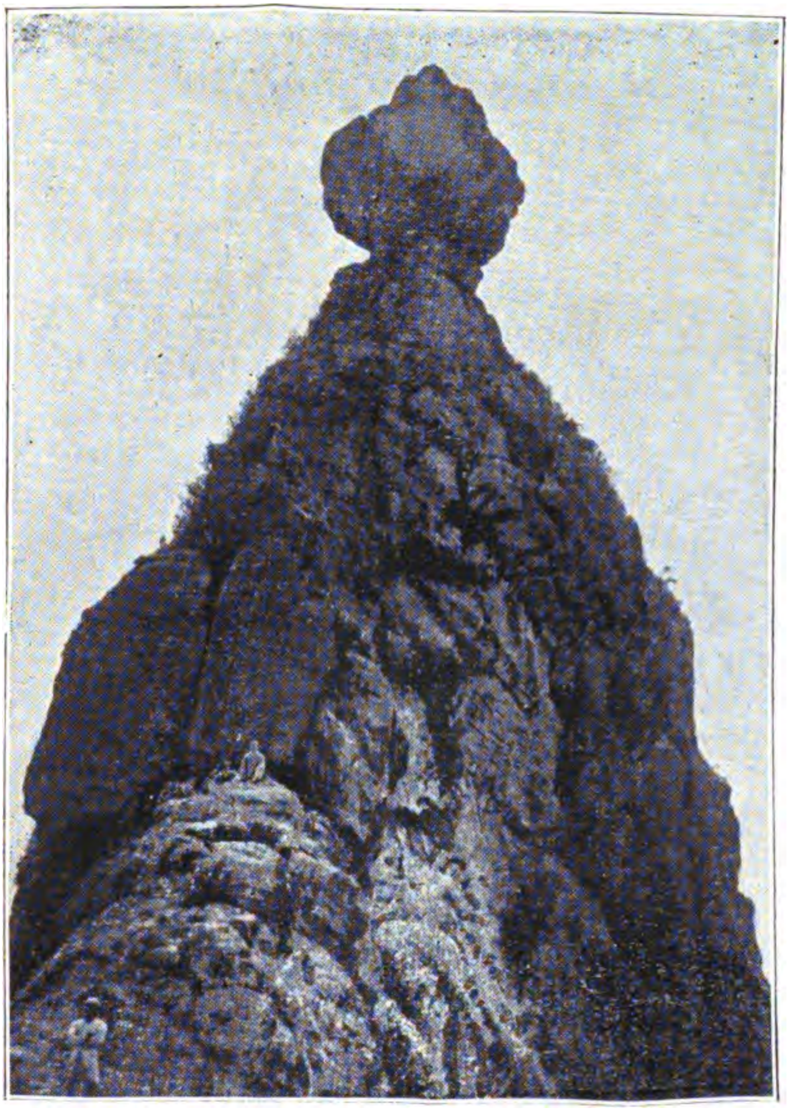

PETER BOTH MOUNTAIN.

brushwood and grass for grip hold, and with a steep incline you reach the neck. Here you can examine the curious structure of the head at your ease. A portion of the solid rock goes vertically upwards for 32 feet, increasing in girth as it ascends. The base of the head is supported on the north and south faces by huge blocks of rock. The head is not a disjointed rock but a continuation of the solid mass of the mountain. With the aid of the iron rings embedded in the rock you reach the top of Peter Both which is oblong, the greater axis giving about 15 feet and the lesser from 9 to 10 feet. Here you have a bird's-eye view, which is truly unique. The rings were put in by Hyppolite Matandie, a plucky creole, who deserves mention for the job : in placing them he stood on one ring, tied himself round the waist to the next above, while he chiselled out the holes for the ring above. A few of such holes would have satisfied most men, but he made in ten days about 68 holes. For the first time in the history of the mountain it was ascended by a lady, in October 1897, dressed in the costume of a mountaineer."

The next highest of the chain of mountains rising at the back of Port Louis is the PONCE. It has a road across it to Moka on the opposite side. On the night of the 22nd of June 1897, during the festivals of the Diamond Jubilee of Her Most Gracious Majesty the Queen, the inhabitants of Moka lighted a bonfire and kept it burning all night on the Ponce, which was seen by ships then at a considerable distance from the shore.

The general appearance of the centre of the island on a S. S. E. bearing, distant 17 or 18 miles in the parallel of Port Louis, looks rugged and inhospitable, but on nearer approach the scenery is superb. After heavy showers of rain the crystal water, coursing down the sides of these mountains to their bases, is a sight to be ever remembered. The great revolving storms that visit the Southern Indian Ocean yearly from December to April is a great factor in controlling the destiny of Mauritius.

The danger from one of these visitants to life, limb, and property is great. A planter may be rich to-day and become a beggar to-morrow. A damaged crop not only means a serious loss to the planters but to the smallest inhabitant also. It is surprising to see the amount of hands a crop has to pass through before it reaches the consumer, and every person must make a profit. In fostering the interests of the planters every person is fostering his or her own; and should a day come when German and Austrian beet-growers succeed in driving away cane-sugar from the Bombay market, the future of Mauritius is questionable.

Three remarkable events occurred during the nineties :—

Small-pox was knowingly introduced by an unprincipled shipmaster and ravished the colony. It cost something like four lakhs of rupees to stamp it out, so that quarantine is justified but not to unreasonable length.

The great cyclone of 1892 will be dealt with in the cyclone pages of this work.

In the latter part of 1893 a great fire prevailed for nearly 30 hours in Port Louis, when a large section of the western part of the town, including the Chaussée, the local Regent street, was destroyed. The damages are estimated at about six lakhs of rupees. It is now being rebuilt in a modern style.

Fires are of frequent occurrence, and perhaps due to unlawful gain, as many shady doings have been brought to light.

In 1879 the population was estimated to be 357,339 ; in 1894 376,219, of whom no less than 259,224 were Indians and Chinese. If the present inflow of Celestials continues, it may reach 400,000 by the year 1900. It is astonishing how people abroad know little of Mauritius and other islands in the tropics ;

but owing to the attention the Imperial Government is at present giving to Mauritius in the way of fortifications and Admiralty docks, a new era may dawn on us soon in spite of trade competition.

PLACES OF INTEREST.

The Island possesses many places of interest. If visitors would only spare their criticism of Port Louis in its present condition and after so many disasters, and travel inland, they would certainly leave the colony with a much better opinion than they now have.

Pamplemousses Garden.

Pamplemousses Garden, said to be one of the finest in the world—and there is some truth in this—is somewhat historic. It is beautifully laid out, having avenues of magnificent palm trees and rare plants from all parts of the world, and numerous lakes or ponds having kiosques on their banks, where pleasure parties are to be seen on Sundays and holidays.

Some of these lakes are teeming with fishes of various sorts, and a pleasant sight is to see them fed by visitors, who generally provide bread from the vendors at the gate. One sort build their nests on the sides of the lakes amongst the weeds in the manner of birds.

Mon Plaisir House, at the south-east part of the garden, the residence of the early French Governors, is now a store-house for the garden. In the yard are two monster tortoises brought from Seychelles by the late General Gordon, and presented by him to the garden shortly before he went to the Soudan. The keeper will tell visitors that these tortoises are a hundred years old—which may be the truth, as they are so long-lived. On entering through the main gate the first avenue to the left leads direct to Paul and Virginia's tomb. It has been rebuilt so often that it has lost most of its dramatic interest; still visitors are sure to smuggle away pieces as a memento.

Moka.

Le Reduit, the residence of the Governor, is worthy of a visit. It is surrounded by ravines and cascades, spanned by the railway bridge on the west. There is a footpath leading from the house to a formidable ravine on the east side, called the "End of the World." The reason it is so named is that neither man nor animal can go any further.

The Acclimitation Garden is also at Le Reduit. Le Reduit was built during the administration of Governor David. The roof of the east wing was blown off during the great cyclone of 1892, when Governor Sir Hubert Jerningham and his Private Secretary, Captain Rose, of the Black Watch, were the only occupants thereof.

Mont Fleury Garden.

Mont Fleury Garden, the property of M. C. Vankersbilk, St. Pierre, Moka, is also worthy of the notice of visitors.

Plaines Wilhems.

Close to town there is "The Castle" and Cascade of Beau Bassin.

"The Castle" was built by Lord Metcalfe, and is now the property and residence of Mr. Edward C. Fraser, of the well-known firm of Ireland, Fraser & Co.

Other places of interest in this district are the Mare aux Vacoas Water Works, newly finished by the eminent Sanitary Engineers, Chadwick and Brine. It has an elevation of about 1,500 feet above sea-level. It is a miniature inland sea, and there are canoes on the Mare for pleasure parties.

A short distance higher is Plaine Sophie, the summer retreat of Sir Celicourt Auselme, K.C.M.G., having a comfortable villa and a large forest abounding with stags. The dining-room is adorned with trophies of the chase.

Visitors must not return without seeing the seven cascades. Carriages are always in attendance at the Vacoa railway station on the arrival of every train. It is better to sleep at the hotel at Curepipe and come down to Vacoa by the early train.

Curepipe.

Curepipe garden and tea plantations, Trou aux Cerfs, supposed to be an extinguished volcanic crater, the Reservoir of La Marie, all within easy drive from the railway station.

Savane.

On the Savane Mountain, at a height of 2,270 feet, is the GRAND BASSIN, said to be fathomless. The water is fresh and rises and falls at intervals.

Black River.

This district is too far for visitors, as it is only reached by carriages, having no railway line at present.

Few strangers coming to Mauritius with time on hand for sight-seeing leave without having visited Chamarel Estate in that district. This estate is situated on a plateau, the height of which is 850 feet above the level of the sea, and the lovely sights from the road winding up from the Black River side once seen are not soon effaced from memory. Here you have a beautiful cascade with a fall of 300 feet; a little further on towards the Savane side is the tea plantation, of which there are 100 acres. Tea from the estate has already been cured and sent home to England, where it is pronounced by experts to be excellent in quality.

On the Black River side, going down towards the Baie du Cap, is the spot where there are different coloured earths arranged in ridges and known as "*les côtes de melon.*"

PORT REGULATIONS.

IMPORTANT PROCLAMATIONS TO BE OBSERVED.

Proclamation,

Every vessel of or exceeding 100 tons register, entering or leaving the port, docking, undocking, or moving from place to place, shall do so under charge of an authorized Pilot, and not otherwise.

The Government is not responsible for any loss or damage occasioned by the act of such Pilot.

Pilots' Ordinance.

"Pilots' Ordinance" of 1881 states that every Pilot shall execute and furnish a security bond with two sureties, jointly and severally bound with him to Her Majesty, her heirs and successors, in the sum of one thousand rupees; the said bond conditioned for the careful pilotage of ships and vessels which he shall conduct according to the condition of his office, and for his proper observation of all laws and regulations, or orders, affecting his office.

Claim on the bond.

In case any party shall have been aggrieved by any act of such Pilot done in the execution of his office, such party may, in his own name and at his own risk as to cost, recover from such Pilot and his sureties the amount of such security bond, or any portion thereof, which to the competent Court may seem just.

Small vessels.

Vessels under 100 tons register will not be required to employ a Pilot, but shall be the same as other vessels under the authority of the Harbour Master, and change places as directed.

Gunpowder.

No merchant vessel arriving with gunpowder shall enter the harbour before a certificate is produced at the Port Office from the person in charge of the magazine that the gunpowder is all landed.

If the magazine is full, the powder will be landed in boats well covered and anchored in the English Channel, according to directions from the Harbour Master. A red flag on a staff to be fixed in the boat in charge of a man.

Jibbooms.

No vessels but warships and mail steamers will be allowed to enter the harbour until their jibbooms are run in.

Bow and Stern Moorings.

From December to April, inclusive, every vessel in the harbour shall be moored with two bower anchors and chains forward and two bower anchors and chains astern, having buoys and good buoy ropes attached to them. In other months one bower anchor and chain astern will be deemed sufficient. Owners and commanders shall at all times take such further precautions for the safety of their vessels as the Harbour Master may require of them.

Pratique flag.

When a vessel has been admitted to pratique, the red Burgee (B) is to be hoisted at the foremast to indicate that communication with the shore has been permitted.

Intending departure.

The commanders of vessels shall give notice in writing at the Port Office of the departure of their vessels: sailing vessels 24 hours' notice, steamers six hours' notice. The Union Jack to be hoisted at the main top-gallant masthead on British vessels from the time such notice is given until departure. Foreigners to hoist the small flags of their country.

Custom House clearance.

No vessels shall be swung preparatory to their going to sea until the clearance from the Custom House is produced at the Port Office.

Swinging.

A vessel, however, may be unmoored and swung on the production at the Port Office of the written authority of the Collector of Customs granted at the request of the agents of such vessel, provided always that the Harbour Master may defer the swinging of the vessel should he consider it necessary to do so.

Remooring.

All vessels shall, if possible, leave the harbour immediately after swinging, and if after the expiration of 24 hours they have not left it, they may be removed, if the Harbour Master thinks fit, at their own expense.

Striking of yards and masts.

From December to April, inclusive, all vessels moored in the harbour are to keep their top-gallant masts and yards on deck, and top ropes and lower tackles rove, in order that they may be in constant readiness to strike top-masts and lower yards on the first order from the Harbour Master.

Provided that the Harbour Master may, upon application, authorize vessels moored in the harbour to keep their top-gallant masts and yards in place, or to send them up before proceeding to sea, should he deem it expedient to do so.*

Upon the signal being made to send down top-gallant yards and masts, all commanders of vessels in the harbour shall repair on board their respective vessels and remain on board while the bad weather lasts. All vessels moored in the harbour shall receive, make fast, or cast off the lines or warps from any warping in or out, or shall slack down their bow or stern chains as ordered by the Pilot in charge of such vessel or other competent authority.

During the day there shall be always one man, and two during the night, on board every vessel. If necessary, the Harbour Master shall procure such men at the expense of the owners or master of such vessel.

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* The starting of topmasts will not be insisted upon but left to the discretion of masters themselves. All yards must be laid fore and aft on deck.

Ensign to be worn

Commanders of merchant vessels of all nations are strictly prohibited from hoisting at any masthead of their respective vessels, while in the roadstead or harbour, any pendant or anything that may be construed into a pendant, or from flying any other ensigns than such as are allowed by law.

Firing guns and Smoking Vessels.

Firing guns and smoking vessels in the harbour for destruction of vermin is prohibited without permission from the Harbour Master. Vessels smoking must invariably light their fires after sunrise and extinguish them before sunset; both operations to be performed under the inspection of the Assistant Harbour Master or other competent authority, and after proper precautions have been taken for the extinction of fire in the event of accident.

Fire in the Harbour.

In the event of an alarm of fire in the harbour, each vessel in the harbour shall send to where the fire is her buckets, axes, mauls, and whatever else she may have on board that may be useful in such case; also as many men to assist in extinguishing the fire as can be spared; such men and means to be under the command of an officer of the vessel to which they belong, and to be placed at the disposal of the Harbour Master, whose lawful orders they shall be bound to execute. The last ship that took fire in harbour was the four-masted ship " County of Roxburgh" from Cardiff with coals.

Shipping of Powder and Hay.

Gunpowder shall not be shipped in the harbour, and vessels embarking hay in any quantity exceeding 20 bales must quit the harbour before night. Every lighter or boat having on board hay or cotton, or any other cargo liable to spontaneous combustion, shall be anchored during the night well clear of the shipping, as directed by the Harbour Master or other competent authority, and the hay, cotton, or other cargo therein shall be well covered with tarpaulins.

Rubbish and Ballast.

No ballast, dunnage, mats, or rubbish of any description whatever shall be thrown into the water of the harbour. A boat will be sent round once a week to each vessel to receive and carry away sweepings of the upper deck and galley. No ballast shall be thrown overboard in the roadstead in less than 30 fathoms of water. No ballast or dirt shall be thrown from the shore into the harbour.

Sunken or Stranded vessels.

In case any vessel be sunk or stranded in any part of the harbour or roadstead, the owner or owners or other person having or pretending to have any property therein, or the commander thereof, shall, upon receipt of an order to that effect given by the Harbour Master, and within the time fixed in such order, clear the harbour or roadstead of such vessel or parts of the same; and in default of such owner, owners, commander or other person aforesaid, disobeying such an order, such vessel or parts of the same shall be removed in such manner as the Harbour Master shall direct, and the expenses of such removal shall be chargeable against the vessel, the owner or owners of such vessel, commander or other person aforesaid without prejudice to the penalties.

Recovering of anchors and chains.

All anchors and cables found in the harbour or roadstead, not attached to a vessel or boat may be taken and removed by the Harbour Master, and shall not be restored to the owner thereof until he has paid to the Harbour Master all expenses attending such removal, and the amount or salvage to which he may be entitled.

At the expiration of twelve months, the same, if unclaimed or unredeemed, may be sold, and the proceeds confiscated for the benefit of Government.

Boiling of pitch.

Pitch, tar, rosin, turpentine oil, and combustibles of a similar nature required while caulking, repairing, &c., any vessel in the port must be boiled in a boat or on a stage alongside the vessel requiring them.

Bathing nude.

All persons bathing or exposing themselves in an indecent manner in any part of the harbour between the hours of sunrise and sunset shall be deemed to have infringed these regulations, but without prejudice to any fine or imprisonment which may be incurred under the Penal Code. If the offender cannot be identified, the master of the ship to which he shall be traced shall be liable for the penalty for breach of these regulations.

Sharks.

Large sharks having lately been seen well up the harbour among the shipping, and one upwards of 13 feet long having been taken, commanders are warned that bathing in the harbour is extremely dangerous.

Receiving and discharging cargo.

Outside vessels moored on either side of the channel by which vessels pass up and down the harbour shall on no account discharge or receive cargo, ballast, or water on the channel side. The lower yards shall also be topped over end, *i.e.*, all vessels moored on the N. E. side of the channel shall only be allowed to work on the port side ; those moored on the S. W. side of the harbour will only be allowed to work on the starboard side.

Landing places to be kept clear.

The wooden steps at the N. W. end of the customs quays and the stone steps on the N. E. side of the fountain are to be kept clear for landing-places, and no boats whatever are to be allowed to make fast there, or lay longer than required for landing their passengers.

Health Officer and Port Officer, their duties.

The Health Officer shall always be accompanied by a Port Officer, who shall require the master to report his name, that of the vessel, her tonnage, the flag under which she sails, the force of her armament, number of guns, number and country of the crew, number of passengers, her cargo, the name of the port whence she sailed, and the motive of the vessel coming to the Island of Mauritius.

Declaration to be signed by the master.

These declarations shall be signed by the master upon the printed form with which the Port Officer shall be provided.

Muster-roll, passenger lists, despatches.

The Port Officer, after he shall have taken down these declarations, shall require to be delivered to him—1st, the muster-roll of the crew ; 2nd, the list of passengers.

Penalties.

The whole under penalty of a fine of £20 sterling against the master who shall not conform to the foregoing enactment.

Communication with the shore.

After the fulfilment of all the abovementioned formalities, the communication with the shore and with the vessel respectively shall be permitted, and the same be announced by means of a red flag hoisted at the fore top-gallant masthead.

All persons other than those mentioned in the preceding articles who, previously to the hoisting of the signal, shall either have gone on board or have landed from the ship shall be liable to one of the penalties mentioned.

HARBOUR POLICE.

Harbour Police. When the assistance of the Police is required on board any ship, Flag H, Commercial Code, should be hoisted at the main. The Police boat is immediately to repair to any ship making this signal. When this signal is made from land, the boat will proceed immediately to the spot where the signal is made, and the non-commissioned officer or constable in charge will ascertain what is wanted.

TIME BALL.

Signal Mountain. The time ball on the Signal Mountain (for chronometer observation) is dropped every Monday, Wednesday, and Friday (holidays excepted) at 1 p.m., Observatory mean time. At five minutes before 1 p.m. the ball is hoisted half mast and two minutes before 1 p.m. full mast. The instant of disconnection of the ball from the cross head is the time to be observed. In the event of accident or error, the ball will be rehoisted half mast, and, if practicable, dropped again at 2 p.m.

The Observatory is situated in—

Latitude	20°15′ 39″ S.
Longtitude	57°33′ 9″ E.
Do. in time	3°50′ 12·6″ E.

When the ball drops at 1 p.m., local mean time, the corresponding Greenwich mean time is 9h. 9m. 47·4s. a. m.

DEPARTMENTAL SIGNALS.

Cyclone signals. Notice is hereby given that the following signals will in future be made from the flagstaff of the Port Office, and repeated by the flagstaff of Fort George, on the approach of bad weather :—

Cyclones : Day signals. A white flag with horizontal blue stripes and ball above at the Port Office, repeated at Fort George, and confirmed by a gun.

Meaning. That the masters of all ships or vessels in this port are required immediately to repair on board their respective vessels, and vessels at the Bell Buoy ought to proceed to sea : send down top-gallant yards and masts and prepare for bad weather : a red flag at the Port Office with ball above repeated at Fort George by a gun : ships at the Bell Buoy to go to sea : vessels in the port to strike lower yards and topmasts.

Night signals. One blue light at the Port Office, repeated at Fort George and accompanied by a gun, means that vessels at the Bell Buoy are to proceed to sea, and vessels in the port to make every preparation for bad weather.

Departmental Code. Departmental Code used in connection with approaching bad weather :—

H. D. No assistance can be rendered.
J. F. You are in a dangerous position.
J. P. Heavy weather coming ; look sharp.
J. S. Stand off ; get an offing.
L. J. Do not anchor on any account.
L. S. Put to sea at once ; get an offing.
L. R. Weigh, cut, slip, wait for nothing.
L. W. Cut away your masts.

M. D.	Do not hold on to your anchor ; let her beat upon the beach.
M. K.	Remain by the ship.
C.	Yes.
D.	No.
K.	Can you see the vessel to the northward of the port ?
L.	Can you see the vessel to the southward of the port ?
M.	Where is she ?
T.	Has the vessel troops or coolies on board ?
D. L.	Is the steam tug in sight ?
D. M.	Be quick with your signal.
D. N.	Is the Pilot boat alongside the vessel off ?
D. P.	Do you think the vessel signalled is in distress ?
D. T.	Steam tug is in sight.
D. W.	How long will it be before she comes to anchor ?
C. P.	Do not enter the port with dismasted vessel until visited by Health Officer.
C. F.	Go after and pick up a boat adrift in direction indicated.
C. N.	Proceed in search of a vessel dismasted in direction indicated.
D. B.	Remain where you are and wait for orders.
C. W.	Take Doctor's boat in tow.
C. V.	Take Pilot's boat in tow.
C. D.	Tow offshore.
C. R.	Tow inshore.
C. S.	Bring the vessel in before she receives pratique if Pilot's schedule is filled up and signed.

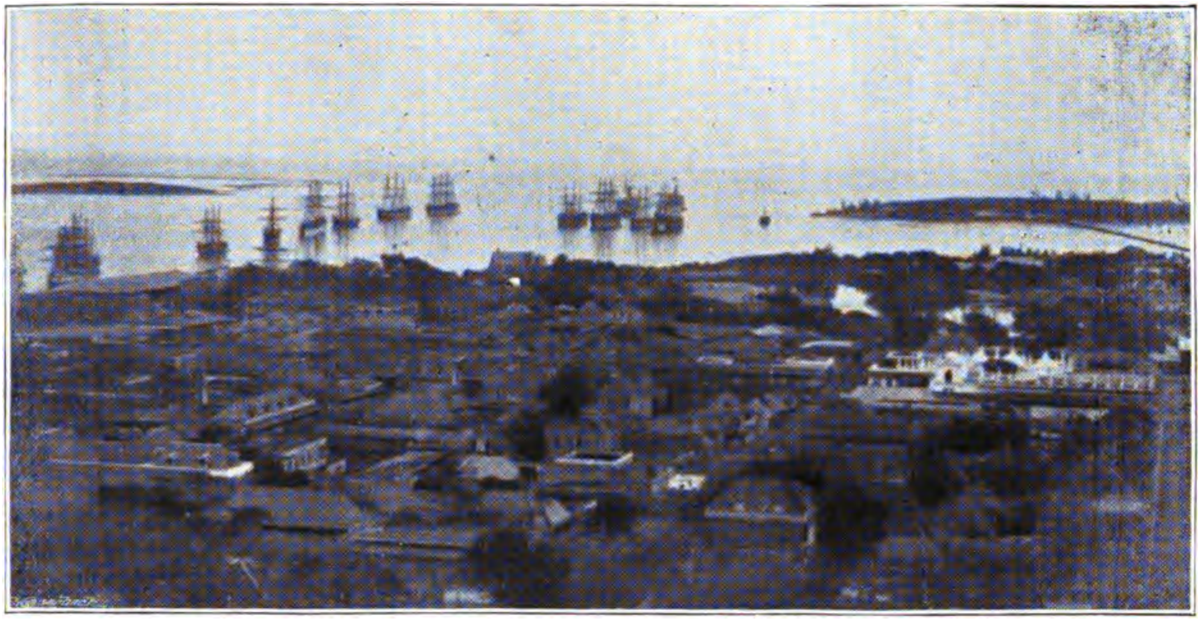
Note.—The greatest attention is usually paid to vessels signalled in distress off the port. The Government steam tug will at once be sent to her position indicated by signals.

Important advice.

In the event of a cyclone coming on, commanders of vessels in this port are earnestly requested to take the following precautions :—The vessels to be securely lashed together in the different tiers, and good fenders placed between them. The more vessels there are lashed together, the greater the security ; but each group should consist, if possible, of not less than three vessels. The best possible fenders are whole coils of coir rope, the larger the better ; they should be hung over the side with a chain through the heart of the coil and toggled with a piece of wood. Topsail sheets would answer the purpose. If rope lanyards are used for these fenders, they may get cut through. Large wooden fenders are objectionable for many reasons, and often do more damage than would have occurred without any. Life-boats should invariably be got on board, and davits unshipped or turned inwards, as most convenient. Chains shall be hove well taut as early as possible to prevent ranging in the gusts, thus starting one or perhaps both the bower anchors. One driving ship will often take three or four others with her. By carrying out those suggestions, it is hoped that the damage and confusion consequent on a cyclone may in a great measure be prevented ; and no one who has not witnessed such a scene as this port presents, during and after one of these fearful storms, can form the slightest idea of the disasters that occur on such occasions.

Remarks.

The above advice by one of the late Harbour Masters of Mauritius might have worked well 30 years ago, when vessels visiting the port were 200 to 450 tons ; at the present time such a proceeding would be quite objectionable. Lashing two and three four-



PORT LOUIS HARBOUR.

This photograph was taken by the Author solely by moonlight, between 9 and 11 p.m.
The Camera was posed on a hill fully one mile from the farthest object.

masters of about 2,500 tons together is not feasible. Had vessels been lashed in the great cyclone of 1892 not many would have been saved; accidents to life and limb would have been great. In this cyclone the vessels drifted about the harbour at their own sweet will until they were all stranded; and the only personal injury was that of the captain of the bark "John Davie," who lost his sight. What an animated scene the approach of a cyclone presents in Port Louis from daylight to dark! The Customs Wharf and Port Office are generally crowded with people watching the ships range about the harbour and yards and masts coming on deck. Every hour a rush is made for the Telegraph Office to see the latest telegram from the Observatory to know if there is any danger of the centre passing over the Island.

Instructions.

Commanders of vessels lying at the Bell Buoy to keep their ships ready for sea in the cyclone season. As soon as anchored, make the necessary arrangements for slipping, in the event of bad weather.

On the appearance of bad weather, get top-gallant yards and masts on deck and reef top-sails. When the signal is made to put to sea do so without loss of time, as the wind frequently shifts much sooner than anticipated. Never attempt to ride the gale out. Be very careful in taking accurate bearings when you anchor, not compass bearings only, which cannot always be depended on, but prominent objects, such as houses near the shore in line with other prominent objects further inland. A pencil sketch of such objects inserted in the log book will be found particularly useful, as the memory cannot always suffice. Never buoy your anchor with rope; always use a ginchain, a top-sail sheet, or something of the kind, and take a large spar for buoy. By adopting this plan you will always find and recover your anchor. In bad weather the coral will cut through a new six-inch Europe rope in 48 hours.

Do not make your buoy chain fast to the bower-chain outside the hawse pipe, as you will have to lift the bight of your cable when recovering it, with of course double its weight; but pass the chain through the hawse pipe and round the windlass, marrying it to the lower part of the chain with single rope yarns, which will break easily, till you come to a shackle; make the end well fast there.

SAILING INSTRUCTIONS FOR MAURITIUS.

All bearings are magnetic throughout this work.

All bearings are compass bearings. The tides along the edge of the reefs between the islands north of Mauritius run at times with a velocity of from three to four miles on the springs; they are generally strong off the *Morne* and along the south coast. Their direction is from E.S.E. to W.N.W., the flood running to E.S.E. and the ebb to W.N.W., varying a point or two according to the wind. The flood tide begins to run one hour after the moon rises.

Whenever the reefs extend to a distance from the land, the lead, if carefully attended to, will be a safe guide in the night; but should the lead be overhove when standing towards the shore, haul off immediately whilst preparing for a fresh cast, if not the ship may take the reef. From 14 to 20 fathoms is considered a safe distance from the reef; but the soundings vary considerably. Of the vessels that have stranded or been lost on the coast of Mauritius, the neglect of the lead was without exception the principal cause; the strength of the currents had also something to do with these accidents, but the neglect of the lead was the most important fact elicited in each enquiry.

Where there is no coast reef marked on the chart the shore is generally bold, having deep water to within a cable's length of it.

A vessel coming from the southward and bound to Port Louis round the north end of Mauritius, the usual track should, after sighting Grand Port Light, steer so as to pass at a distance of about four miles, when, at that distance, the light bears W. by S. A N.N.E. ¼ E. course for nine miles will, if the weather is clear, bring a vessel in sight of Flat Island Revolving Light bearing about N.N.W. ½ W. Vessels arriving from the southward and eastward should be careful not to bring the light on Flat Island to the northward of N.N.W. ½ W. until Gunners Quoin bears west, when they may pass midway between it and Flat Island. This course will lead about 2½ miles clear of the reefs that extend from the north-east coast of Mauritius.

Wreck of the "Marie."

On passing Gabriel Island give a good berth to a reef that extends about a quarter of mile to the S.S.E. of it. This warning should not be neglected. The Cape brigantine "Marie" was lost on this reef at 11 o'clock at night in 1890. If the weather is very fine the sea does not always break upon it.

When to the westward of the Quoin, Canonniers Point Light will be seen, steer with Flat Island Light astern bearing N.E. by E. ¾ E. until the Canonniers Point Light bears S.E. by S. (which will carry a vessel clear of the reefs that extend from the point); haul up S.W. by S. till the Bell Buoy Floating Light is seen.

Should the night be clear when running down the coast, the eastern shoulder of the Corps de Garde Mountain will be seen in line with the Harbour Floating Light, when the latter bears S.S.W. ¼ W.

Remember especially that after passing Cannoniers Point Light on your way to the Bell Buoy, the light on the point changes from white to red; if it be brought to bear more northerly than N.E. ½ E., this change will warn you that the vessel is too near the reefs that skirt the coast between Cannoniers Point and Pointe Piment. But this change from white to red is only intended as a guide as far as Pointe Piment, after passing which the Harbour Floating Light will be your guide to the anchorage. It is not advisable for a large vessel ever to approach so near the reef as to change the Cannoniers Point Light from white to red. The great object in thus arranging the light was the convenience of the numerous coasting vessels belonging to the colony, to whom (knowing the ground as they do) it is most useful.

The best mark for keeping clear of the reefs between Cannoniers Point and Pointe Piment by night is to keep Flat Island Light open to the westward of Cannoniers Point Light until the Harbour Floating Light is brought to bear S.S.W. ½ W.

Should you be approaching the Cannoniers Point Light from the westward, when it shows white, and steering directly for it, there can be no change of colour; but by attending to the bearing of Flat Island Light, it will be impossible for you to run on the reefs.

The barque "Cornwall," steering E.N.E. for Cannoniers Point Light, was wrecked on the reef within three-quarter of a mile of the light-house, because it was erroneously supposed that the light changed colour on approaching it whenever a vessel was to the southward of it, whereas it is only when it is brought to bear N.E. ½ E. and to the northward of that, that the light changes colour.

The ship "Lyra" was wrecked on the Whale Rock in 1882 within a cable or two from the light-house. At the court of enquiry the master's plea was that both Flat Island and Cannoniers Point Lights were obscured and could not be seen. This is somewhat unusual for Mauritius. The master's certificate was suspended for six months.

When running for the anchorage by day, after passing Cannoniers Point with Flat Island Light-house bearing N.E. by E. ½ E., bring Tamarind Mountain (a conical hill to the westward of all other high land) to bear S. W. by S., and steer for it until the Bell Buoy Floating Light vessel is seen in a line with the eastern shoulder of the Corps de Garde bearing S.S.W. ½ W. : this will lead clear of all danger to the anchorage, which is indicated by the floating light vessel.

When approaching by night from the south westward, Flat Island Light bearing N.E. by E. will lead between two and three miles to the westward of the reefs to the southward of the port, and when the floating light bears E. by N. ½ N. steer for it, if the wind be favourable, under easy sail ; keep the lead going, bring the Harbour Floating Light to bear as already described, and anchor.

Cape Malheureux Channel.

The channel between Cape Malheureux and Gunners Quoin is 2¼ miles wide from edge to edge of reefs. It is perfectly safe during the day, and can be used as a short cut by vessels coming up from Grand Port. Coasting vessels use this channel both night and day.

Malheureux Rock.

Malheureux Rock, about one mile N.N.W. of the Cape, carries 29 feet over it. The depth ranges from 8 fathoms at the east entrance to 10 and 15 in the centre, increasing to 18 and 20 fathoms off Pointe Vacoas. The "Dunalistair" and "Knight of the Garter," two dismasted ships, passed through, the masters of these ships being strangers to Mauritius. The latter had no chart, as all cabin furniture and navigable appliances were washed away during a cyclone south of Mauritius.

An unusual coincidence occurred some months ago. Two well-known coal-ships left Cardiff for Mauritius ; both kept company the whole way out and sighted the coast together. The master of one of the ships took the channel usually frequented between Flat Island and Gunners Quoin ; the other passed between the Quoin and Cape Malheureux, and anchored one hour before the other vessel. This channel is advantageous in two ways. A master wanting to sight the anchorage before dark, so as to see what ships are at anchor at the Bell Buoy to pick up a clear berth, would save an hour or more by passing through this channel.

Dismasted vessels afraid of drifting away to the westward after passing through the outer channel could use this one, and anchor off the Cape if considered necessary. The signal station on shore would communicate to town for the Government tug. If in a position to sail up she would be well to windward of the position she would have been had she passed through the other channel.

Passing north and west of the island.

Vessels bound to Port Louis from the north-eastward, if they do not choose to attempt the Flat Island passage during the night, especially in squally weather, should pass north of Round and Serpent Islands, rounding the latter about three-quarter of a mile. The water is bold all along, and no danger need be anticipated. When west of Serpent Island haul up so as to pass Pigeon House Rock off Flat Island from a quarter to half a mile on the port side. During the night this rock can be seen at a great distance, standing alone on certain bearings ; on others, it forms one with Flat Island. After passing the rock, and when the big channel is opened out, steer for Cannoniers Point Light as already directed.

In the months of May, June and July, when the S.E. trade winds are strong, the wind seldom blows from S.E. direct. On nearing the coast the wind blows generally, in the above months, from any point between S.E. and S., but more so from S.S.E. with the wind at S.E. A vessel can always fetch the anchorage after passing Cannoniers Point if at not too great a distance to the westward. Wind to the south of S.E., and especially running two or three miles west of the point before hauling up to sight the floating light, will be sure to cause delay in beating up to the anchorage.

It is also of frequent occurrence to have the wind from April to July, at any point between S.W. and N.W., blowing for three or even five days at intervals. At night the wind will shift so that a vessel, beating off the port during the day, and seeing the position of ships at anchor outside, could work in and anchor.

Should a vessel delay for daylight towards morning, the wind will fall to a calm, and at about 8 a.m. freshened up from the westward again. These westerly winds extend sometimes as far as Rodrigues Island. On or about the sixth day the wind will go back to the south and east.

During the day, after rounding Cannoniers Point, and when in sight of the light ship, if her head and any other vessels that may be at anchor are turned to sea, haul off the reefs without delay; for although you may be laying up with a fresh S.E. or S.S.E. wind, it will drop to a calm in a moment, and within five minutes the wind will be from west or north-west. Many vessels have been caught in this way and stranded on the reefs. Immediate assistance is always sent from the Port Department to tow vessels off.

In hauling out with the first indication of westerly winds, a fair wind could be made of it to the anchorage. My experience in this way are varied. Passed the point at 10 a.m.; saw the ships at anchor heading out to sea, a vessel with square yards coming up from the westward. Although I had a strong S.E. wind, I hauled out to sea without delay. Between Pointe Piment and the light vessel the wind fell suddenly. I got between the two winds, and had to continually swing the yards from side to side until sunset, when the wind became steady, beat up to the anchorage, and anchored at 9 p.m. The other vessel, three or four miles out to sea, lost her fine westerly wind, and must have suffered the same annoyance, as she did not anchor until 9 o'clock on the following morning.

Puffs off the Mountains.

In May, June and July, when the wind is at S. or S.S.E., violent and very unsteady puffs blow off the mountains and valleys. They are felt immediately after rounding Gunners Quoin. A ship with old sails bent may find them blown to rags. It is advisable to have the best topsails and courses bent.

Anchoring at night.

The proportion of ships that anchor during the night and those that wait for daylight are at par. I prefer to lay to between Cannoniers Point and the floating light vessel until daylight if passing the point any time after midnight. If anchored at night, you may be ordered to go to the quarantine ground next day; then a collision may occur, going in with vessels at anchor; but the greatest annoyance of all is letting the anchor go in a deep hole. It is not generally known to strangers that, coming into the anchorage and rounding to east of the light vessel, they are apt to drop anchor in a 30 fathoms' hole or on the edge of a detached coral bank with soundings at its outer edge varying from 50 fathoms to a greater depth. These holes are on a bearing coming in from between S.E. and S.E. by S. After passing Tombeau Bay, and when the first bearing is crossed, and heading straight for the light vessel, 17 fathoms may be obtained with the hand lead. The next cast immediately after the first no bottom may be reported. The ship will then be passing over a hole of 30 or 35 fathoms; continue the lead until 18 or 15 fathoms are reported; continue into 12 fathoms; then round to and anchor east of the light vessel at a convenient distance. If expected to go in quarantine, pass astern of her and anchor to the westward on a sand bank having 7 to 15 fathoms. Small vessels anchoring on the east side are to be careful not to go too close to the torpedo buoys that line the coast off Tombeau Bay. The telegraph cable is also on this side.

Drifting off the edge of a bank.

On one occasion I anchored at night in 15 fathoms, sounding obtained, in the morning when heaving short; the anchor came off the ground with 30 fathoms to the water. Before the anchor was hove up to the hawse she drifted miles out to sea. The anchor must have been dropped on the edge of a coral bank.

Loss of anchor in a hole.

A barque came in at night in July squally weather and unsteady puffs off the mountains. She anchored on the east of my vessel. She had a fine patent windlass. At 8 a.m. the Pilot came on board, hove short, and tug boat made fast. Up to 3 p.m. continual heaving; they could not get the anchor. It was in a hole of 30 fathoms. The topsail sheets were then bent on the cable and slipped next morning. A mooring launch came to recover the anchor and cable, but the buoy had disappeared. I watched the whole proceedings. The weight of the topsail sheets naturally took the wooden buoy under. If a stout piece of Manilla rope of sufficient length had been bent on to the topsail sheet to allow it to sink to the bottom, the buoy being attached to the rope would have floated. All that the launch men had to do was simply to haul up the end of the topsail sheet and take it to the winch and heave up the cable. As this was not done the anchor was lost.

Wooden buoy.

I always have in readiness for slipping in the cyclone season two three-inch deal planks 12 feet long, lashed together with wire; a chain strop at one end; the end of a light piece of steel wire rove through the chain strop hitched on the bight; the end then led along to the centre of the planks, and secured.

Light houses and vessel.

Sailing directions for making the anchorage of the harbour of Port Louis, Mauritius, with reference to the light houses erected upon Flat Island, Ile aux Fouquets, and Cannoniers Point, and also the light vessel at the entrance of the harbour.

DESCRIPTION OF THE LIGHTS—FLAT ISLAND.

This is a revolving catoptric light of the first order, situated at the south-west or highest extremity of the island, in latitude 19° 54′ S. and longitude 57° 41′ 12″ E. determined by co-ordination from the Observatory (Pamplemousses). The variation of the compass is 10° 19′ W.

Its elevation above mean level of the sea (the rise of tide being only three feet) is 366 feet, and will be visible in clear weather from the deck of a vessel 13 feet above water a distance of 25 nautical miles.

ILE AUX FOUQUETS—GRAND PORT.

Grand Port Light house is built upon a small island, called "Ile aux Fouquets," in latitude 20° 23′ 34″ S. and longitude 57° 46′ 12″ E. It marks the south entrance to Grand Port, and is 800 yards to the E. N. E. of the Ile de la Passe. There is a small islet between them.

Ile de la Passe, which bounds Grand Port entrance to the northward, is easily known by the battery and other buildings. The depth is from 14 to 20 fathoms. The reefs from either side are perfectly visible from the foreyard.

The island on which the light house is built is two miles to the eastward of the nearest point or mainland, and on the very edge of the coral reef which skirts this part of the coast of Mauritius. The light house (as well as the adjacent building) is white; its ground-line is 39 feet above the mean sea-level, and it forms a most conspicuous object, which cannot be possibly mistaken.

The light house serves as a guide to vessels passing Grand Port by day or night. The apparatus is a dioptric of the first order, showing a fixed white light from sunset to sunrise, visible in every direction from the seaward but dark on the land side. The light (focal plane) is 108¾ feet above mean sea-level (the rise of tide being three feet), and in clear weather can be seen at a distance of 16 nautical miles from the deck of a vessel 12 feet above the water.

Vessels bound to Mahebourg may approach the light on any bearing from north by east to west by south. When about two miles from it, they should heave to with the head offshore until the Pilot comes alongside.

A vessel coming from northward, having Flat Island Light on a bearing of N.W., must be careful, after sighting Grand Port Light, not to bring it, when at less than eight miles distant, on a more southerly bearing than S. W. by W. ½ W., or she will be too near the coast and the reef to the northward of that light.

In 1884 the ship "Kelvinside" was lost in this locality. She was bound to Port Louis from Cardiff.

The coast reef to the eastward of and bounding Grand Port is a bank of irregular soundings extending some distance to seaward. The lead, if carefully attended to, will prove a tolerable guide in very thick weather.

The bearings in the foregoing instructions are all magnetic, and will carry a ship at least three miles from the coast reef. The light on the point is a fixed catoptric of the first order. It is situated in latitude 19° 59′ 54″ S. and longitude 57° 32′ 45″ E. Its elevation above the mean level of the sea is 89 feet 6 inches, and can be seen from the deck of a vessel 14 feet above water, about 10 nautical miles.

HARBOUR FLOATING LIGHT.

Lightship.

The floating light vessel is moored a little to the northward of the well-known Bell Buoy with the following bearings :—Extreme of land to the northward, N. E. by N.; extreme of land to the westward, W. S. W.; flagstaff of Fort George, S. E. ½ S.; depth of water 15 fathoms. The vessel is painted white, which enables her to be distinctly seen against the dark land during the day. She shows a flashing white light from sunset to sunrise, visible nine miles in every direction from seaward. The fact of this being a flashing light, at short intervals, sufficiently distinguishes it from the revolving light on Flat Island.

Vessels from the northward, after rounding Cannoniers Point, must be careful not to bring the light on the point to the westward of Flat Island Light till the floating light at the Bell Buoy is seen. She may then steer for the light on a S. S. W. ½ W. bearing, and anchor on that bearing from half a mile to a mile from the light.

Vessels approaching the port from the westward may steer for the floating light on an E. by N. ¼ N. bearing, and either half a mile from her on that bearing or further to the northward, as convenient.

The outer mooring chain of the floating light runs about 110 fathoms in a N. N. W. direction. Vessels must therefore be anchored in such a manner as to avoid hooking it. The depths at the anchorage vary from 10 to 20 fathoms. All bearings are compass bearings.

CUSTOMS REGULATIONS.

Abstract of the laws and regulations in force which specially concern masters of vessels.

Officers of Customs on board.

1. The Collector may station on board any vessel in port any officer or officers of Customs; and every master shall supply such officer or officers with suitable cabin accommodation, according to his or their rank, under a penalty not exceeding Rs. 200.

Report at Custom House, and list of unconsumed stores.

2. The master of every vessel arriving at Mauritius, in ballast or otherwise, must appear before the Collector and make his inward report with full particulars; and also deliver a complete list of all unconsumed stores, within 24 hours of his arrival in port, and answer all questions put to him truthfully, under a penalty of Rs. 500 and forfeiture of all goods and stores not reported.

Agent of vessel or authorized person acting as master.

In cases of mail steamers or impossibility of master to attend and make report, the agent or person duly authorized by the master may do so at his risk and peril.

Goods unladen without permit.

3. No goods shall be unladen without permit, or, in cases of vessels in distress, except under special sufferance of the Customs authorities, under penalty of forfeiture of the goods.

Sundays or Public Holidays.

4. No goods shall be unladen from, or shipped or transhipped on, board of any vessel on Sundays or public holidays without the express permission of the Collector, and between the hours fixed by him, under a penalty not exceeding Rs. 500.

Landing Cargo after three days.

5. On neglect of importer within three working days (Sundays and holidays excepted), or on expiry of delay in bill of lading (in no case to be taken to mean less than one full working day after report of ship at the Customs) to land goods, the master or agent may land them under authority of the Collector of Customs and place them in the Queen's Warehouse.

"Lien" of master on cargo landed "ex officio" for freight, &c.

6. The master may declare if he has "a lien" for freight, primage and general average, or other charges of a stated amount, in which case the Collector will not allow removal of goods, landed after expiry of delay, until the master or agent of the vessel declares that the claim is satisfied.

7. The Collector of Customs may allow the master to land cargo at any time after entry at Customs on payment of the storage rent, according to tariff rate, until the expiration of the three working days.

8. The Collector may, after entry at Customs, allow any cargo to be landed by special sufferance if agents of vessels are willing to take charge of same and on fulfilment of certain formalities. Consignees in such case shall only be liable for tariff rate of lighterage if they make their entries in due time.

Penalty for unnecessary delay in landing goods.

9. After ten working days the master of every vessel entered at the Customs is liable to a penalty of Rs. 25 per diem for each unnecessary day's detention of goods for which importer has passed entry and presented permit to land.

Liability after 15 days for Customs Officer.

10. After 15 days from date of report, ship is liable to Rs. 3 per diem for expense of Customs Officer on board.

Master may obtain duplicate permits.

11. When permit to land has been granted and not sent on board the same day or following day, the master may obtain a duplicate of his written declaration that he cannot land goods for want of a permit.

Regulation as to stores from bond.

12. Stores for consumption by crew and passengers of any merchant ship leaving Mauritius may be taken duty free from bond. Amount may be restricted by Collector. Bond is to be furnished not to land such stores in the colony or dependencies.

Stores to be put under seal.

Stores to be placed under seal until the departure of the vessel from harbour on outward voyage.

Penalty for breaking seals.

Penalty for breaking seals without authority Rs. 500 and three times the amount of duty payable on the goods under seal.

Stores not to be shipped without victualling bill.

13. No stores to be put on board except under a victualling bill; and all goods shipped without one shall be forfeited as goods shipped without report.

Surplus Stores to pay duty.

14. Surplus stores are liable to duty as other goods when allowed to land by permission of Collector.

Entry outwards.

15. The master of every vessel leaving the port must deliver an outward entry under his hand, showing destination of vessel, name, country, tonnage (if British), port of registry, name and country of master, country of owners, number of crew and how many of the country of the ship, and no goods can be laden on board such vessel before entry outwards under penalty of Rs. 500.

The master must also bring before the Collector a contents and victualling bill, and make declaration to truth thereof, before he can obtain a clearance, under a penalty of Rs. 1,000.

In cases of mail steamers, or whenever it be not possible in the opinion of the Collector for the master to attend, the agent of the vessel, or other person duly authorized by the master, may fulfil all formalities and make all declarations at the risk and peril of the master.

Stiffening Order.

16. The Collector may upon application of master, being satisfied that it is necessary, grant a stiffening order to lade heavy goods or ballast on board before inwards cargo is wholly discharged, or he may allow entry outwards before the vessel is unloaded.

Goods laden contrary to regulations.

17. All goods laden before entry and without a permit, except under special sufferance of stiffening order, are liable to forfeiture.

Master's name of registry of vessel.

18. Customs Officers may refuse to recognize a master whose name is not endorsed on the register of a vessel or until it be so endorsed.

Transhipment of goods in bond.

19. Goods may be transhipped in bond without being actually landed and deposited in the warehouse. Transhipment in transit for other ports when from vessel to vessel is free of duty.

Dogs not to be landed without certificate.

20. No dog shall be landed except on a permit issued by a Customs Officer after production of certificate from the Government Veterinary Health Officer and upon payment of duty.

Any master allowing a dog to be landed otherwise is liable to a penalty of Rs. 100.

N.B.—The transhipment of stores free of duty is not authorized by the Customs laws.

Cargo and Ship Stores.

21. The master of every ship may land in any of the ship's boat's cargo or stores imported in the said ship ; and may also employ the said boats for shipping provisions and all others articles or objects for the use of the said ship.

Hours of landing and shipment of goods.

22. The hours for working on board of vessels in the harbour are from gunfire in the morning till 3 p. m. for the landing of goods, and from the same time in the morning until sunset for the shipment of goods. The Collector may authorise an extension of the hours fixed for the landing and shipping of goods.

List of passengers.

23. The master of every vessel carrying passengers shall before clearance sign and deliver to the Collector of Customs a list, in duplicate, of all passengers, including the cabin passengers, proceeding in the said vessel, and if after clearance he embarks other passengers, lists of these must be delivered to the Collector under a penalty of Rs. 50 for every passenger not declared on the passenger list.

Name and port of registry of British vessels to be painted on stern.

26. Every British vessel shall have her name and the port of registry painted on a conspicuous part of her stern on a dark ground in white or yellow letters of a length not less than four inches; and in default of the name and port of registry not being so painted, or of any concealment, absence, or of any avoidable obliteration of the name and port of registry as aforesaid being made, the master and owner of such ship shall each incur a penalty not exceeding Rs. 1,000.

Colours to be worn by British vessels when in port.

27. If any colours usually worn by Her Majesty's ships, or any colours resembling those of Her Majesty, or any distinctive national colours, except the Red Ensign usually worn by merchant ships, or except the Union Jack with a white border, or if the pennant usually carried by Her Majesty's ships, or any pennant in any wise resembling such pennant, are or is hoisted on board any ship or boat, owned by a British subject, without warrant for so doing from Her Majesty or from the Admiralty, the master of such ship or boat, or owner thereof if on board, shall incur a penalty not exceeding Rs. 5,000, and such Jack colour, or pennant shall be forfeited.

Boats of vessels to have thereon the name of vessel, port, and master.

28. The owner of every ship belonging, wholly or in part, to any of Her Majesty's subjects shall paint or cause to be painted upon the outside of the stern of every boat belonging to the said ship the name of the said ship, the port or place to which she belongs, and the master's name within the transom in white or yellow letters of not less than two inches in length on a black ground, on pain of forfeiture of every such boat not so marked.

Declaration of vessels carrying cattle,

29. The master of every vessel arriving at this port with cattle is bound to make a declaration to the Government Veterinary Health Officer as to whether there exists or has existed, among the cattle on board his ship, any contagious or infectious disease, or whether such disease existed or had recently prevailed at the place whence he arrives, and shall produce a bill of health to that effect, without which no cattle shall be allowed to land ; and in case the declaration so made be false, he shall be liable to a fine not exceeding Rs. 2,000 and to imprisonment for one year, with or without hard labour.

Pilotage dues of steamers calling here for water, coal, &c,

30. Pilotage dues payable by steamers entering the harbour merely for the purpose of taking coals, provisions, and water are reduced to half the amount to which they may be liable.

Light due of vessels passing the Little Basses and Minicoy Lights.

31. A charge of 2½ cents and of 7½ cents respectively will be levied on all vessels, according to their registered tonnage, which shall after the exhibition of the light from the Minicoy Light house, have passed the same, and which shall also have passed the Little Basses Light house, between the 1st and the 30th September and between the 1st October and 21st March, exclusively, and within the limits specified in Ordinance XXIII of 1883.

Declaration of gandia on board.

32. The master of every ship in which gandia shall be brought to the colony shall make a declaration thereof to the Collector of Customs, in reporting his ship inwards; if not so declared, the gandia shall be held to be unlawfully possessed and imported, and the master of the ship, as well as the persons in whose possession the gandia shall be found, shall be liable to the penalties prescribed by articles 25, 26, 27, and 28 of this Ordinance—

(i) to imprisonment not exceeding one year and to a fine not exceeding Rs. 1,000;

(ii) to the same penalties as a person who has committed any such offence;

(iii) to forfeiture of all boats, vehicles, and cattle used in the unlawful landing, removing, &c., of the gandia;

(iv) to imprisonment not exceeding one year.

Regulations for vessels having dynamite and detonators on board.

33. No merchant vessel with gunpowder, dynamite, and detonators or other explosives on board shall enter the harbour before discharging the same at the Bell Buoy into lighters flying a red flag, and under the care of a proper guardian. These lighters to be moved in the place indicated by the Pilot or Harbour Master, pending instructions from the Customs authorities; these goods must also be placed in separate lighters, and landed and stored separately in the magazine at Fort William. Every master of a ship with dynamite or detonators on board must, on arrival at the Bell Buoy, declare that he has such goods on board to the Pilot or boarding officer, failing which he shall be liable to a penalty not exceeding Rs. 2,000 and not less than Rs. 500, and to an imprisonment of from eight days to three months.

Masters' and Mates' certificates.

34. No British ship shall go to sea from any port in Mauritius unless the master thereof has obtained and possesses valid certificates, either of competency or of service, appropriate to his station in such ship or of a higher grade.

No British ship of 100 tons burden or upwards, shall go to sea from any port in Mauritius unless at least one officer, besides the master, has obtained and possesses a valid certificate of competency or of service appropriate to the grade of only mate or to a higher grade.

Penalties.

35. (1) Every person who goes to sea from any port of Mauritius as master of a British ship, or as first or only mate of a British ship, of 100 tons burden or upwards, without being at the time entitled to, and possessed of, such a certificate as is required by the preceding article, shall be liable to a fine not exceeding Rs. 500.

(2) Every person who employs any person as master of a British ship, or as first or only mate of a British ship, of 100 tons burden or upwards, without ascertaining that he is at the time entitled to, and possessed of, such a certificate as is required by the preceding article, shall be liable to a fine not exceeding Rs. 500.

N.B.—The appliances to be carried by British vessels for saving life at sea are strictly enforced. Ships and steamers not complying will find much difficulty in clearing at the Custom House.

CHAPTER II.

MAURITIUS QUARANTINE LAWS.

THE quarantine Ordinances of Mauritius are so intricate and cumbersome that all the history that ever was written of the Island cannot be considered as complete without the numerous Ordinances that are so continually framed and amended. The year 1897 is a memorable one in the history of Mauritius quarantine. The breaking out of the bubonic plague at Bombay caused an unnecessary panic. To quote the words of an old writer, who said "the fear of death tendeth at times to cause unreasonableness in man" is justified by the extremes to which the Mauritians have this year carried their anti-plague precautions. No doubt quarantine for a small Island like Mauritius, where Asiatics are in majority, is necessary to a certain extent. The plague scare was brought about by a few leaders who excited the people in such a way that it would have been dangerous for a shipmaster, just admitted to pratique, to walk about the streets of Port Louis if it was known that a simple case of fever existed on board his ship. For three weeks great excitement prevailed, and my ship and the S.S. "Cashmere" from Bombay were kept in illegal quarantine in the outer anchorage. On the 20th January the officer administering the Government informed the Director of the Public Health Department that the resolution of the Quarantine Committee with regard to the cargo of the barque "Grosvenor" was illegal. The Quarantine Committee met on the following day and resolved that no decision would be arrived at until the Legislature had passed an Ordinance amending the Quarantine Laws. On the same day or the next an extraordinary session of the Council was summoned by the Anti-plague League under great excitement. The Government wisely rejected their proposal to compel all vessels from Bombay and other Western Indian ports to return with their cargo. The importance of the decision of Government will be seen by the comments on a despatch from Downing Street published by the *Planters' and Commercial Gazette* of Port Louis :—

Despatches from Downing Street.

" We are in presence of a number of recent despatches from Downing Street of more or less import. On reading them it is almost impossible not to recognize the masterly manner in which the Right Honourable the Secretary of State treats the several intricate matters that have been brought to his notice. Mr. Chamberlain possesses the enviable intellectual ability of being able to grasp the thread of an argument at sight and of expressing his conclusions thereon in brief but decisive language. His reference to the despatch relating to the summoning of an Extraordinary Session of the Council of Government in January of this year is an instance of his clear insight into a question that to even moderate thinkers has become aggravatingly controversial. Mr. Chamberlain evidently views with disfavour the irrational assumptions of our Quarantine Committee, and in a few but telling words has signified his disapproval of a course of action which for years past has resulted in bringing Mauritius into ridicule, and which has materially interfered with its harmonious maritime relations. In acknowledging the despatch reporting the circumstances in which an Extraordinary Session of the Council of Government was summoned for the purpose of considering an amendment of the law relating to quarantine in Mauritius Mr. Chamberlain says:—'I learn with satisfaction that the Draft Ordinance was rejected by the Council of Government; and I trust that this result will strengthen the hands of the Governor in resisting unreasonable proposals of the Quarantine Committee.'

"The time has not yet come for Sir Charles Bruce to unfold his views on this much-vexed question; but we trust that when it does arrive, the country will find that His Excellency is prepared to walk in the footsteps of science, and that he will not be cajoled into supporting the antiquated notions with which some of our sanitary authorities, save the word, are imbued."

On the 28th January I was permitted to come between the two forts and discharge my cargo in quarantine. Being one of the aggrieved parties, I started a campaign against Mauritius Quarantine Laws in the public press, and instituted a claim against Government for damages. This has been settled to my satisfaction after a single hearing before the Judge.

The proprietors of the *Planters' and Commercial Gazette* of the colony, the *Times of India*, the *Advocate of India*, and *Fairplay* kindly placed their pages at my disposal. The *Times of India*, in commenting on my series of letters, published the following:—

Quarantine in Mauritius.

"We should imagine that official opinion in Mauritius is slow to be moved by argument, and that it will require more than the rapid diminution in the plague which has lately set in to persuade the authorities of the Island that they are greatly overdoing things in quarantining against India. But it may be noted that when the late Governor, Sir Hubert Jerningham, took his farewell of Mauritius, he acknowledged in addressing the Port Louis Municipality, on the one hand, that the population was singularly easy to frighten, and, on the other, that the Quarantine Committee was the most stringent quarantine authority in the world. Since that interesting deliverance by the retiring Governor two noteworthy events have happened. One is the arrival of Sir Charles Bruce, who is free to apply an open mind to the question whether Mauritius, in order to meet the whims of a nervous community, could not better consult its own interests than by maintaining 'the most stringent quarantine in the world.' The other has been the pronouncement by the High Court of Mauritius of a judgment in which the action of the Quarantine Committee in applying this same quarantine system against the German steamer 'Donar' was held to be illegal.

"News travels slowly from Mauritius, and a good deal may have happened since then; but the last that was heard on the subject was that the Legislative Council of the Island has been considering how the law could be accommodated to the action of the Board of Health. Some amendments in the existing regulations were resolved upon by the Council; but the new law still awaited third reading, and it was expected, at the time the mail left, that some modifications would be introduced 'so as not to cause unnecessary obstruction to the transport of the food-supply of the country.' The new Governor has come at a time when he may hope to influence opinion and practice along more reasonable lines than they have followed hitherto. The judgment of the High Court is as severe a condemnation of the quarantine measures of the Mauritius Government as could well have been passed. A quarantine which the law had strictly limited to twenty-one days has been extended to five weeks, the Health authorities having claimed a right to keep the vessel as long after the quarantine period as was necessary or convenient for fumigating and disinfecting her and everything on board: this meant unlimited power or detention—a thing which might commend itself to an ignorant and nervous population, but which no sensible community would demand for its protection. If the case of the 'Donar' was bad however, what is to be said of the experience of the 'Grosvenor,' a sailing ship from Bombay, which, after forty days at sea, was deemed to require three weeks' quarantine lest it should carry infection to Port Louis!

"The captain of the ship has enlivened the Mauritius papers with an account of his experience and with his views of the policy which the wisdom of the authorities of the Island has imposed upon its shipping. But what is more important than the discredit which the administration have brought upon themselves is the effect of their measures upon the trade of the Island. The policy enforced in a panic is in a fair way of doing more mischief to the Island it could avert were the dangers of infection infinitely greater than they are. Mauritius depends upon India for its coolie labour and a large part of its food-supply. In return for this it sends sugar to India—a trade which has lately been severely cut into by Austrian and German competition; and so the captain of the 'Grosvenor,' who writes to the papers while in quarantine, tells the authorities that in interfering as needlessly and as foolishly as they are doing with the shipping from Bombay, they are seriously injuring the trade of the Island. As to the needlessness of these measures, Mauritius has only to listen to competent local advice, for we observe that, in recent debates in the Legislative Council, the now established truth that the microbe of plague will not live in grain and other staples was insisted on by more than one member.

"If Mauritius and Ceylon and other Governments that have made themselves ridiculous by the stringency of their quarantine regulations would only revise them in the light of Mr. Hawkins' recent report upon his bacteriological experiments with Indian staples, they would soon be brought into line with science and good sense. But when the scientific knowledge of the middle ages is applied to the sanitary policy of the end of the nineteenth century, we must not be surprised at any measure of extravagance."

The *Nautical Magazine* of November 1896 published an interesting letter from the pen of Sir Sherston Baker, Bart., Editor of the *Law Magazine and Review*. The bubonic plague scare was then at its height in Europe. To quote a portion of this interesting letter, it informs us that on the 7th of August a short Act of Parliament, entitled the Public Health Act, 1896 (59 and 60 Vic., c. 19), was passed. This Act repeals the whole of the old Quarantine Act of 1825 which applied to the United Kingdom and the many subsequent Acts modifying or extending the last-named statute. He also went into figures, and pointed out the expenses, misery, and cruel injustice quarantine entails, and hoped all lands that are interested in quarantine will be guided by modern medical science for their welfare. Quarantine, meaning literally a space of forty days, is exceedingly ancient, and doubtless has its origin in the Jewish ceremonials, lepers and unclean persons being proscribed during forty days. It will also be remembered that a plague visitation fell upon the Egyptians in the desert B. C. 1471. The Venetians however are believed to have been the first to establish what we in later times understand as "quarantine"; and it is probable that their sanitary regulations against the introduction of the plague were first issued in 1127. All merchants and others coming from the Levant were obliged to remain in the House of St. Lazarus, or the Lazaretto, for forty days before they were admitted into the city of Venice, the Lazaretto there being built in the water, and is still standing. It was not until the plague of Marseilles in 1720 that quarantine regulations were thoroughly understood.

The old quarantine laws were based on two principles—first, that the epidemic diseases which at various times had desolated the world were communicable by contact with persons affected, or by contact with things touched by persons affected. The other principle was that the spread of epidemics could be stayed by prevention of this contact. A great modification of opinion has of late years taken place on this subject; and the majority of medical and scientific men are now convinced that "contagious diseases" are not always communicable by contact, but rather may be produced by local and atmospheric causes, and, therefore, that such require medicine and sanitary measures, not merely drastic quarantine regulations. The College of Physicians of New Orleans, in a report made in 1852, strongly favoured the adoption of sanitary instead of quarantine measures, and have shown the good effects of the former, basing their opinion on the fact that a century ago the yellow fever extended to twelve degrees of latitude further north than it did in the above year, and claiming that its retrogression was to be attributed to sanitary measures and not to quarantine. It is this same opinion that has been instrumental in lessening year by year the practice of quarantine in the United Kingdom.

The rigour with which quarantine was administered in the past, not only abroad but in England, has sometimes been productive of cruel wrongs. A familiar instance is doubtless known to those travellers who have visited Leghorn. There is on the mole an immense marble statue, representing the Grand Duke's son, who was put to death for breaking quarantine. The story is this. A pirate had been committing a series of depredations amongst the boats and other craft belonging to the Duke's dominions, and nobody would attack him. The Duke's son, being braver than the rest, manned a boat and went out to meet that common disturber. After a hard fight the Duke's son overcame and brought away some of the followers of the pirate as prisoners, who of course were put in quarantine, it not being known from whence they came. The son was so elated with his victory that he jumped on shore to tell the news, and thereupon was put to death by his father for breaking quarantine.

In later days we have the case of the unfortunate vessel the "Eclair," a sloop of war, which in 1845 arrived at Portsmouth from the coast of Africa, having lost on the station and on her passage home half her crew from yellow fever, including her commander, Captain Estcourt. On arrival at Portsmouth, the principal medical officer of that port, Sir John Richardson, was eager to have the crew landed at once, and carried to an airy and well-ventilated ward of Haslar Hospital. His advice was unfortunately overruled, and the vessel was ordered to perform quarantine in the usual manner, the Superintendent of Quarantine not even allowing her to lie at the Motherbank for fear of her doing injury to the ships in the neighbourhood. She was therefore sent round with a Pilot to Sandgate Creek, which is said to have been the most unhealthy station in the whole of Kent. She was kept there for ten days in quarantine. Several deaths took place in that interval, amongst them that of the unfortunate Pilot. At last the Admiralty on hearing of the mortality interposed, and stated that if the vessel remained longer in quarantine, there were no means or chance of saving the survivors of the crew. In consequence of this representation made to the Privy Council the crew were suffered to land. Two of them subsequently died, but the rest were saved. It is clear that if this ship had been a merchant vessel instead of a man-of-war she would not have been allowed to be removed from quarantine, and probably the whole of the crew would have succumbed to the disease.

Eighteen years later we have the case of the unfortunate merchant ship "Shah Allum" that left the Bell Buoy, the outer anchorage of Mauritius, in a cyclone, never to return. Those who remember the occurrence say she was in quarantine when she was forced to proceed to sea to her doom. Two other vessels were wrecked on the coast of Mauritius in proceeding to sea from the quarantine station, but I cannot trace their names. In 1892 the schooner "Marmion" left the quarantine station and foundered with all on board.

The latest extravagance of quarantine measures is the story told below by a lady-survivor of the British ship "Traveller."

STORY OF SHIPWRECK.

CRUELTY TO SURVIVORS.

Awful Sufferings of a Fever-stricken Crew.

Wreck of the "Traveller."

Probably one of the most remarkable tales of shipwreck and adventure through quarantine, narrated within recent years, has been told by Mrs. Andrew Christie, widow of Captain Christie, of the wrecked ship "Traveller." Mrs. Christie, who belongs to Liverpool, has just arrived here after undergoing perils and hardships, in company with the other survivors of the crew, that were almost beyond human endurance. From Mrs. Christie's statement it appears that the ship "Traveller," with a cargo of sugar, was going from Java to Delaware Breakwater; and almost as soon as the vessel left the river, fever of the usual Java type broke out, and this spread day after day until every one on board the ship was affected with the malady, including Mrs. Christie herself, and even her baby-boy, about eleven months old. Death after death took place, and the victims were one after another buried at sea. One of them, a Dutchman, while delirious with fever jumped into the sea and ended his life. The Chief Officer of the ship died on 14th December; and on the 28th Mrs. Christie's husband, Captain Christie, also succumbed. This cast a terrible gloom over the ship: some of the men gained a little strength but others died, until the death-roll at last amounted to eleven. This left ten to man the ship, with a second mate, Mr. Ritch, a Liverpool man, in charge. Mr. Ritch decided to make for Mauritius to obtain assistance. Later, at a time when he had but two men and himself to work the ship, he approached Rodrigues Island. With wonderful skill they brought up their vessel off the island, and then dropped anchor. They thought that they could get assistance and medicine there, and that all danger was passed. The treatment they received however Mrs. Christie describes as the most remarkable and inhuman, and was rendered doubly so in view of the prostrate condition of the survivors. Rodrigues Island is inhabited by French creoles: the Governor and Doctor however are white, and, although French, could speak English. The Pilot came off in his boat; but when he heard of the sickness, which was explained to him as the usual Java kind, he would not board the "Traveller" but returned to the shore, and the report was spread that the vessel had yellow fever on board. The helpless people waited hour after hour for assistance but none came; and fearing that their vessel would go ashore every minute, Mr. Ritch decided to take his crew on shore. A boat was launched, and Mr. Ritch and two convalescent seamen lowered Mrs. Christie, her baby, and the other sick members of the crew into it. As they approached the shore, the Governor and a number of others rushed down to the water's edge and threatened to shoot the shipwrecked people if they landed. Mr. Ritch asked them if they were Christians to treat people in such a manner. His men, he said, had not the strength to pull back to the ship, and if they got there they would all very likely be drowned. Mr. Ritch asked for assistance to take his vessel out of its dangerous position, and to give succour and medicine for his sick crew. These appeals were met with no response, and for fear of being fired on the poor people had to row back to their ship. No assistance was sent to the ship, either in the shape of a doctor, or of hands to man the vessel; and that night the "Traveller" was carried on the reefs and wrecked. Fortunately she did not go to pieces then, or every soul on board would have been in all probability lost. Finding that something must now be done, the Rodrigues people sent a boat the next morning with the Pilot, and this boat took off Mrs. Christie and her child. Mr. Ritch launched the ship's life-boat, but as his crew had not the necessary strength to man it, some people were sent from the shore. All of the shipwrecked people were taken to a sand island near to where there were no inhabitants. They were kept there twenty-one days in quarantine. They lived in a hut made of leaves, and for the three weeks had nothing to lie down on but leaves. So fearful were the Rodrigues people of contact with the shipwrecked crew that the food they sent was conveyed from one small boat to another and then put on the beach.

On the twenty-second day it became patent to those at Rodrigues that as the monsoon was setting in, and it was likely that the island would be covered by the sea, its occupants were in great danger. They were therefore removed to Rodrigues; but their number had now been reduced to eight of the crew and Mrs. Christie and her child. On Rodrigues Island they remained two months, and during that time were well treated. After this they went to Mauritius, and there met with all possible attention and kindness. Six of the crew were brought from Mauritius in the "Warwick Castle," as well as Mrs. Christie and her baby. It is understood that the underwriters have made representations in the matter to the Home Government.

The gruesome tale of the sufferings of the fever-stricken crew of the "Traveller" and of the inhumanity with which the sufferers were treated by the inhabitants of the island of Rodrigues presents a disagreeable contrast, declares the *Globe*, to the delightful narrative in which Lady Barker described her visit to the island in 1881. Rodrigues, lying about 360 miles to the east of Mauritius, is a British possession, having been taken from the French in 1810, and formally ceded to this country at the peace in 1814. The population, numbering 2,500, on an area of about 42 square miles, is French creole, imported from Mauritius, living mostly in two villages—one on the coast, and the other far up the slope of the central height of the island, which rises to about 1,300 feet. The French "patois" which they speak is a corrupted inheritance from the days of the French planters. Lady Barker and her companions were delighted with their gentle courtesy of manners, their good temper and docility, and not unprepared to find evidence of laziness, supineness, and shiftlessness. Owing mainly to these defects of disposition, the dark-skinned inhabitants of the island have been now and then reduced to scarcity; and, at such times, they have been ready to cry for help from outside. The island is seldom visited, for, owing to the want of enterprise in the population, there is little facility for communication with the rest of the world, and, save in brief official reports, public attention is seldom invited to its resources. The formation is volcanic, and the coast is encircled by reefs, among which approaching vessels have to find their way with care; but the soil is fertile, and there are rich pastures along the shores where thousands of cattle graze, while the jungle inland affords sustenance for deer and wild fowl. The climate is "enchanting." There are no serpents or other noxious animals.

Fruits, such as oranges and limes, grow in profusion. The one notable event in the history of the island was brought about by its reputation for salubrity. In 1813 the whole of the British squadron assembled there, bringing the sick and wounded, after the capture of Bourbon and Mauritius. The island shore became for a short time a hospital ground, and did not disappoint the expectations of those who had made the choice. Thus the recent unfortunate incident in which cruelty is said to have been perpetrated on a fever-stricken crew not only belies the reputation of the islander for kindness and genial good humour, but also runs counter to their own tradition appealing to English sailors. Before condemnation is launched against them, the tale should be heard, as it doubtless will be told, from their point of view.

Mauritius quarantine —(continued).

As far back as November 1882, the Marine Board of Mauritius, in giving judgment in the case of the S.S. "Clan Campbell," were of opinion that with proper appliances, promptly used, and unrestricted by quarantine laws, the vessel might have been floated on the 22nd or 23rd of September. Unfortunately the appliances were wanting and the quarantine laws had to be observed. In my researches I found that this steamer was valued at £50,000 and the cargo £6,000. I am of opinion that had the appliances for floating been at hand, and could have been used with success, the Quarantine Committee at that time would have been unanimous in sacrificing ship and cargo rather than violate one iota of their quarantine laws.

The judgment in the case of the S. S. "Donar" must not be allowed to pass unnoticed, and it is here given in full.

CHAPTER III.

JUDGMENT—QUARANTINE, "DONAR" CASE.

Judge L. V. Delafaye.

THE following is the judgment delivered in that case on the 8th of March, by Mr. Justice L. V. Delafaye :—

Kwong-sing & Co., plaintiffs, vs. *The Colonial Government, defendants.*

The German steamer "Donar" arrived in Mauritius on the 21st of May 1896 at 8 a.m., having left Hongkong on the 26th of April at 5 a.m. and Singapore on the 6th of May at 6 a.m. She was placed in temporary quarantine owing to her producing a foul bill of health from Hongkong, where bubonic plague was prevailing, and a clean bill of health from Singapore, but an annotation to the effect that some cases of sporadic cholera had broken out among the native population.

The Quarantine Committee met on the day of the arrival of the vessel and adopted the following resolutions :—"That under articles 28 and 32 of Ordinance VI of 1887 and article 3 of Ordinance V of 1890, the steamer 'Donar' be kept in quarantine for 21 days from the date of her departure from Singapore ; her passengers landed at Flat Island station to undergo the same period of quarantine. Further, that the clothes of the passengers and crew be washed, aired, their effects disinfected, and the vessel fumigated according to law."

It would appear that the sea was so rough at Flat Island that the passengers could not be landed, and the vessel was ordered (the parties are not agreed by whom) to return to Port Louis.

At a meeting of the Committee on the 26th of May a second resolution was adopted :—"That in view of the impossibility to land the passengers at Flat Island, they be sent to Cannoniers Point Quarantine Station, and the measures of disinfection previously ordered carried out, provided that all clothing actually worn by the passengers be disinfected on board before disembarkation. A further meeting to be held in connection with the disinfection of the cargo before disembarkation."

In the meantime a second attempt to land the passengers at Flat Island having been successful, the Board met on the 27th of May and agreed—"That after fumigation and cleaning of the vessel, as provided for by Regulation 198 of 1888, and the washing and disinfection of the clothes and effects of the crew, certain goods (which are enumerated) be disembarked after having undergone external disinfection." The next meeting of the Committee took place on the 28th of May, when Resolution No. 4 was adopted. "That on the return of the steamer 'Donar' from Flat Island the measure of disinfection already ordered be at once carried out; that the vessel be not admitted to pratique until after the disinfection of its cargo." And some measures were prescribed for the guidance of the Sanitary Inspectors, Custom House Officers, and journeymen to be sent on board to carry out and supervise the disinfection of the goods previously enumerated.

On the 29th the Committee adopted Resolution No. 5, part of which is to the following effect :—"That after the clothes of the crew and their effects have been disinfected and the vessel fumigated, she be allowed to come between the two forts to disembark the goods previously enumerated ; but that the vessel should thereafter return to the outer anchorage in order that the other goods on board, such as are mentioned in Regulation 198 of 1888, be aired and fumigated according to law."

On the 1st of June, in presence of certain queries and objections made by the commander of the ship, Resolution No. 6 was adopted :—"That the Committee maintains the decision already come to without any modification; and that, if it be found impossible to carry out such decision, the captain should apply to Government for the necessary means for so doing."

On the 2nd of June the Committee slightly modified their 6th resolution.

The case of the "Donar" was again considered on the 8th and on the 9th of June, when no measures of any importance were agreed to.

On the 12th of June Resolution No. 8 was adopted :—"That after disinfection and disembarkation of the cargo mentioned in Resolution 3 of 27th May 1896, the other part of the cargo remaining on board be disinfected externally while the steamer is between the two forts, except new woollen goods, which should be unpacked and exposed to the air for 24 hours prior to disembarkation; that, after disembarkation of all goods on board, the steamer be thoroughly fumigated before being admitted to pratique."

On the 18th of June they adopted Resolution No. 9 :—"That all cargo on board be landed after disinfection, except the packages containing the passengers' luggage. When all cargo is out of the vessel, the owners to be allowed to go on board to claim their luggage, which may be delivered to them on condition that the boxes be opened and their contents disinfected as previously ordered. After this process the steamer is to be admitted to pratique, subject to the case being further considered by the Committee."

On the 25th of June the Committee resolved :—"That as the disinfection of the clothes and effects of the passengers had not been carried out as previously ordered, the steamer cannot be admitted to pratique until this has been done."

Finally on the 26th of June the vessel was admitted to pratique.

The plaintiffs sue the Colonial Government in damages; they allege in their declaration that all the resolutions of the Quarantine Committee, at all events some of them, are illegal, inasmuch as the vessel should under no circumstances have been detained in quarantine for more than 21 days from the date of her departure from Singapore; that especially the Quarantine Committee had no power to order that the cargo should be disinfected before the vessel was admitted to pratique; and that in consequence of the delay entailed by that order the damages were suffered.

The Colonial Government has pleaded several pleas *inter alia* :—

Plea No. 3—"That the several resolutions and decisions of the Quarantine Committee which were approved and acted upon by the Mauritius Government were legal, warranted, and justified."

Plea No. 5—"That it was lawful for the Quarantine Committee to recommend, and for Government to order, that the said fumigation and disinfection should be performed after the period of 21 days for which the vessel has been ordered to be placed in quarantine."

Plea No. 6—"That it was lawful for the Quarantine Committee and for Government to order that the goods and articles forming part of the cargo should be disinfected before the steamer was admitted to pratique, inasmuch as the said vessel having, within 21 days of her arrival in Mauritius, communicated, otherwise than by signal, with Singapore, where cholera was reported to be existing at the time, the said steamer had become and was an infected vessel within the meaning of our quarantine laws."

The learned counsels on both sides have urged upon the expediency of deciding *in limine* the question of law raised by the three pleas above referred to, and more particularly by the sixth plea.

The point comes to be determined under articles 27, 32, and 38 of Ordinance VI of 1887. Article 28 enacts that—" When a vessel has, within 21 days before her arrival, communicated, otherwise than by signal, with any infected vessel or place, the Board may order the vessel to perform quarantine for such a number of days as, when added to the time which has elapsed since the vessel communicated with such infected place or vessel, will not exceed the time prescribed for quarantine with regard to the disease with which the vessel may be supposed to be infected." And article 29 enacts that—" When a vessel arrives without bill of health as in article 24 mentioned, the Board may order the vessel to perform quarantine for such a number of days as, when added to the time which has elapsed since the vessel's departure from the port or place which she left within such bill, will not exceed 21 days." Article 32 confers further and more extensive powers upon the Quarantine Committee. It reads as follows :—" In cases coming under articles 27 and 28, the Board may further order that, before the vessel is admitted to pratique, the said vessel shall be fumigated and disinfected in such manner as the Board shall direct, and that articles or goods likely to introduce into the colony the disease with which the vessel is infected shall not be landed until such articles or goods have been disinfected."

The Director of the Medical and Health Department shall by regulation specify and declare the articles and goods which are likely to introduce into the colony a contagious or infectious disease.

Except such goods as may be specified in any such regulations, cargo shall not be liable to be disinfected under this article :—" The Board may make a similar order in any case when a contagious or infectious disease has existed on board a vessel during her voyage to Mauritius or when a vessel arrives from an infected place."

This article gives the Board the power to make a two-fold order :—

1stly—It may order that before the vessel is admitted to pratique, she shall be fumigated and disinfected in such manner as the Committee may direct.

2ndly—It may order that the articles or goods which form part of the cargo shall not be landed until such articles or goods have been disinfected.

But is the Board warranted under that article in decreeing that a vessel, situated like the " Donar" was, shall not be admitted to pratique so long as the articles and goods composing the cargo have not been disinfected ?

For the affirmative, it has been argued on behalf of Government that the incidental phrase " before the vessel is admitted to pratique " in article 32 governs both members of the phrase in the first paragraph, and shall be read as if they are understood between the words " that " and " articles and goods " in the last part of the first paragraph of that article ; and that besides the Quarantine Committee should, in certain special cases, be allowed a very great latitude in the exercise of their powers. I cannot accept that theory, which seems to me repugnant to the correct grammatical construction of the article. It seems to me clear that two distinct things and two different processes of disinfection have been contemplated by the legislator ; and this is made more manifest still in presence of Regulation 198 of 1888, to which reference is made in Resolution No. 3 of the Quarantine Committee. That regulation was framed, as appears from its preamble, " for the disinfection of vessels, cargo, and effects of passengers and crew in virtue of article 32 of Ordinance VI of 1887," the mode of disinfection being different in each of the cases—vessel, cargo, or effects of passengers.

The Committee is armed under Ordinance VI of 1887 with very extensive powers, and it is proper that it should be so. As the guardians and protectors of the public health in this colony, they have to adopt certain measures for cases of an urgent nature which are not foreseen specifically by any existing law; and it is highly expedient that in those cases when the law is silent they should be allowed certain discretionary powers, and that their hands should not be tied.

But at the same time when they are acting in virtue of a clear text of law—when the legislator has taken care, as in article 32, to establish two different sets of ideas, making distinction between the ship and her cargo, and when that distinction is emphasized by a regulation which directs one mode of disinfection to be applied to the ship and a different one to the cargo—it is difficult to find any warrant for the proposition contained in plea No. 6 of the Government, *viz.*, that it was lawful for the Quarantine Committee to order that the cargo of the steamer "Donar" be disinfected before the steamer be admitted to the pratique, *i.e.*, to apply to the second part of the article, which deals with cargo, a restriction which only affects, and was only meant to affect, the ship. The legislator, when framing article 32, and the Government, when approving Regulation 198 of 1888, seem to have considered that after 21 days' quarantine, when fumigation and disinfection of the ship have been performed, either within the 21 days or a short time after, a vessel can be safely approached and communicated with; and that with regard to the cargo it is sufficient that it should be disinfected, provided the disinfection be carried out with the sanitary precautions stipulated in the regulations of 1888.

I do not think that the Quarantine Committee would be justified in going beyond this, and in imposing such measures of disinfection of the cargo as would have for their effect to detain a ship for a much longer period than 21 days without her being admitted to pratique, which is equivalent to an extension of quarantine.

Upon the whole, I am of opinion that it was competent for the Quarantine Committee to order that the steamer "Donar" be fumigated and disinfected in conformity with Regulation 198 of 1888, and that she be not admitted to pratique until such fumigation and disinfection had been completed as directed by the Committee, but that such resolutions as have ordered, either directly or implicitly, that pratique should be suspended until after the disinfection of the cargo were *ultra vires* and illegal.

Justice Piggot. The following is the judgment delivered by His Honor the Acting Chief Judge in the above case:—

The S. S. "Donar" arrived at Mauritius on the 21st May, 25 days out from Hongkong and 15 days out from Singapore. She had a foul bill of health from Hongkong, and cholera existing at Singapore, which was her last port of call, the Quarantine Committee ordered her to perform quarantine for the legal period, *viz.*, 21 days from the time of her leaving that port—6th May. The passengers were sent to Flat Island, and orders were given as to the disinfection of their clothes and effects. The question of disinfection of the vessel and cargo was reserved until after the quarantine period had expired. On the 27th May, on which day the quarantine expired, further orders were given as to the fumigation and disinfection of the ship and cargo; further resolutions were passed on the subject at different times, the result of which was that pratique was suspended during the process, and the ship was not allowed communication with the shore until the 26th June, that is to say, about 28 days beyond the expiry of the quarantine. The legality of the resolutions of the Committee in which their orders were given is called in question by the charterers of the ship, the plaintiffs in the present action, who claim damages for the alleged illegal detention. The Government has defended the action, alleging in their defence the legality of the action of the Committee. The Substitute Procureur-General has raised a question of law as a preliminary point, and the fate of certain paragraphs in the declaration and defence will be determined by the light of the judgment which we now give on this question of law. The question depends on the interpretation to be given to articles 27, 28, and 32 of Ordinance No. VI of 1887, the fundamental law on quarantine. The two first articles deal with quarantine of "infected vessels" and "vessels coming from infected ports." Article 32 deals with fumigation and disinfection of vessel and cargo.

The first point taken for the plaintiffs was that the measures provided for by article 32 must be taken within the quarantine period. The words of the article on the face of them negative this contention :—"The Committee may further order that before the vessel is admitted to pratique the vessel be fumigated and disinfected." But this plain view of the question was attacked by a very ingenious argument. Admission to pratique is what happens at the end of quarantine : suspension of pratique is therefore the same as quarantine ; "during the period of quarantine" is therefore synonymous with "before the vessel is admitted to pratique," and may therefore be substituted for it in article 32. This argument branched off into another argument.

Quarantine is fixed by law : the Committee have no power to extend quarantine beyond the legal period : to order disinfection after that period, and to suspend pratique during the process, is to extend the period of quarantine, and is therefore illegal. If I could admit the premise I could admit the conclusions, but I think the premise unsound. I do not admit that suspension of pratique and quarantine are identical. The Ordinance treats them as distinct : pratique is dealt with in the early articles, quarantine in the late ones ; and it is to be observed that the words "order" and "perform" are always used with regard to quarantine, which points to the conclusion that while suspension of pratique is a passive state, performance of quarantine is active. I admit that the consequences of the two states are very much alike, because in both the ship is cut off from the shore. But the argument we are considering assumes them to be identical ; and as article 32 refers to suspension of pratique and not to continuing quarantine, we must be assured of the identity before we substitute one expression for the other. One test suffices, I think, to show that they are not identical. If pratique is merely suspended, and the ship is not ordered to perform quarantine, could the passengers be sent to Flat Island? Clearly not, because that would be quarantine, and quarantine must be expressly ordered. This preliminary examination of the question clears the ground of one argument, but it is very far from disposing of the case. On account of the very great importance of the issue both to Government and the community, it seems better first to ascertain clearly what the powers of the Quarantine Committee are in law, and then to examine the resolutions of the Committee to see if they are within the law.

I proceed therefore to the analysis of article 32. It begins thus : "In the cases provided by articles 27 and 28," *i.e.*, in the cases of ships which have had contagious or infectious diseases on board 21 days before arriving at Mauritius (article 27), or which have touched, otherwise than by signal, at an infected port 21 days before arriving at Mauritius (article 28). This seems to be the true purview of the article ; it may be argued that we should add "and which have been ordered to perform quarantine" to complete the meaning of the words "in the cases provided by articles 27 and 28." I doubt however whether this is necessary or was intended by the Legislature, as it would prevent the Quarantine Committee requiring disinfection unless they also imposed quarantine—a power which I think they possess as I shall show further on. The article proceeds: "The Quarantine Committee may further order that before the ship be admitted to pratique, it is to be fumigated and disinfected," that is to say, in the cases contemplated by articles 27 and 28 the Committee "may further," that is, "also have the power," which, while it does not compel, yet allows both precautions to be taken; for these words may clearly be expanded into "may, in addition to what is prescribed in those articles with respect to those vessels," order such vessels to be fumigated and disinfected.

But what is prescribed in articles 27 and 28? Quarantine for a certain period. So that under articles 27, 28, and 32 the powers of the Committee, so far as I have examined them, should be thus stated: "When a ship has had a contagious or infectious disease on board 21 days before arriving at Mauritius, or when a ship has touched, otherwise than by signal, at an infected port within 21 days before arriving at Mauritius, the Quarantine Committee may order quarantine, in the first case, for the time prescribed with reference to the disease with which the vessel is infected: in the second case, for the same period counting from the date of leaving the infected port; and may also order before she is admitted to pratique the fumigation and disinfection of the vessel." "Before the ship is admitted to pratique," treat the period of quarantine as the only sanitary precaution in which time enters into consideration, assume that the suspension of pratique and quarantine are identical, assume further that at the end of quarantine the ship is entitled to pratique, and I admit at once that the disinfection must be done within 21 days, and that the sentence would become—"Before the end of the quarantine period the Quarantine Committee may order the disinfection and fumigation of the vessel." But this is to assume the whole point in issue. Once let it be established that there are two things—suspension of pratique and imposition of quarantine—two things not radically different perhaps, but two things as to which the law does in fact make a difference—then it follows that the provisions which the law contemplates in article 32 are different in their nature from quarantine; that the quarantine period and the period required for disinfection are distinct, and that they may be imposed either separately or jointly. This bears out the view that I take of the words "the cases provided by articles 27 and 28," the distinct nature of the two remedies, and the wording of the article seem to me to show that the Quarantine Committee have power, not merely to impose quarantine without disinfection, or to impose disinfection in addition to quarantine, but also to order disinfection without quarantine. In this examination I have passed by entirely the *a priori* arguments which were used on both sides, not that they were irrelevant—they were, on the contrary, both relevant and interesting; but if the text of the law is clear, there is no necessity for launching into debateable theories. The argument, however, which the Substitute Procureur-General used, based on proclamations of 1878, is important. That was the first time disinfection had been ordered. It seems to me obvious that when, with the fuller experience of seventeen years, the provisions came to be redrafted, modifications and improvements of the system would be introduced; and therefore I should not expect to find its provisions textually reproduced. There is indeed an important modification in the proclamation. During the disinfection the ship had to perform temporary quarantine; but in article 32 of Ordinance No. VI of 1887 these words are omitted, and their place is taken by the words "before the ship is admitted to pratique." This supports the construction of the law which I have already laid down: I must now revert to the construction of the article. The disinfection so far has dealt with the vessel only. The provisions as to the cargo remains to be considered. The grammatical construction of the whole sentence is, I think, as follows: The Quarantine Committee may further order (*i*) that before the ship is admitted to pratique it shall be fumigated and disinfected; and that the cargo shall be disinfected before it is landed. I do not think that the form of the sentence will allow us to apply the words "before the ship is admitted to pratique" to the last sentence as to the cargo: if this had been intended, the word "that" would have followed, and not preceded, the words "before the ship is admitted to pratique."

Mr. Newton adopted the suggestion as to this construction which was made by Rouillard, J., because, as he admitted, he thought he saw in it a way through the difficulties which beset his former argument and, as he thought, the argument of his opponent. According to his later argument the powers of the Quarantine Committee were to order in sequence first quarantine, second disinfection of the vessel after quarantine but before pratique, third disinfection of the cargo but after pratique. But he had to admit that the ship would of necessity be detained for disinfection after the 21 days of quarantine if she arrived, for example, on the twentieth day; but he was willing to concede this power for the short time required for fumigating the ship so long as the disinfection of the cargo took place after pratique, *i.e.*, when the ship could communicate with the shore. But it was assumed that the disinfection of the ship would only last a few days, whereas the disinfection of the cargo must take a considerable time, and it seemed to be rather on this ground that Mr. Newton was disposed to accept the suggested construction. But this is the thin end of the wedge: once admit that disinfection may take place after the quarantine period, it must also be admitted that the ship cannot have pratique until the disinfection is over; and there is therefore a concession that communication with the shore may also be prohibited though there is no quarantine, and the argument must then shift its ground: the contention must then be that too much time has been occupied by the disinfection of the cargo. And indeed it is round this point that the difficulties congregate. It is to be observed that the disinfection of the vessel is left entirely to the discretion of the Quarantine Committee; it is to be in such a manner as they may direct. And this at least must be admitted, that as the Committee are told that they may order the disinfection of the ship, they are justified in seeing—nay, it is their duty to see—that the disinfection is complete. And it may very well be that the Committee may consider the prospect of infection so serious that they do not consider the disinfection would be complete until the cargo has been removed, and that part of the vessel in which the cargo was stowed disinfected. I think if the case demands it that pratique may be postponed until after all the cargo has been got out of the ship in order that the holds in which the infected cargo had been lying may be disinfected. This apparently leads us to the same result as if we read the words "before the ship is admitted to pratique" as governing the last sentence of the article which relates to the disinfection of the cargo. But it is only "apparently" I have carefully abstained from considering the disinfection of the cargo. The grammatical construction of the sentence being what it is, I cannot admit that pratique may be suspended until after the cargo has been disinfected; but the possible circumstances of the case and the discretion of the Quarantine Committee being what they are, I do see a power to suspend pratique until the vessel has been completely disinfected, though this may involve a delay in getting the cargo out of the ship in order to disinfect the holds. The line of distinction between the two things seems to me to be sharp and well defined. I will illustrate my meaning by a concrete case, which may or may not demonstrate my ignorance of quarantine and disinfection methods, but which seems to me to be quite possible. Suppose the case of probable infection so serious that the Committee determine that the holds of the ship be washed down with chloride of lime. How could this be done unless all the cargo was taken out of the holds? The argument of the plaintiffs must go to this, that such a measure could not be ordered, or if ordered, would be illegal. This contention seems to me impossible. The Quarantine Committee must have this power, if there is anything at all in disinfection, and it seems to me to have been expressly given to them. The form which has been given to the sentence seems to give the Committee very wide powers: on the one hand, they have power to make the fumigation of the ship last till all the cargo is off the ship and to suspend pratique till then; and on the other hand, they have the power to order the disinfection of the cargo without suspending pratique at all; and it is to be observed that they would not have this power if the words "before the ship is admitted to pratique" were held to govern both branches of the disinfection sentence of article 32. It will be said that to invest the Quarantine Committee with a discretion which enables them to suspend pratique for an undetermined time would be to give them an arbitrary power which might in its exercise lead to very grave abuses. But the answer is that "it would nullify the system of disinfection if they had not the power to insist on its being complete." I think that the Legislature has given them this power, and has done it advisedly. But there is this safeguard against its abuse—that an unreasonable, intolerant, vexatious, or malicious exercise of it would probably give rise to an action in damages. In order to complete the analysis of this important article we must now examine the last paragraph. It allows the Quarantine Committee to make a similar order in any case (i) when a contagious or infectious disease has existed on board a vessel during its voyage to Mauritius, or when a vessel arrives from an infected place. The first part of the sentence corresponds with article 27, the second part corresponds with article 28, except that there is in neither part any reference to the 21 days. What then do the words "in any case" mean? I have little doubt that they mean "in any case not provided by the first paragraph of article 32." The first paragraph dealt only with the cases coming within articles 27 and 28, *i.e.*, in which the vessel has had an infectious disease on board 21 days before arriving at Mauritius, or has touched, otherwise than by signal, at an infected port within 21 days of her arrival at Mauritius. The first paragraph deals only with infection or supposed infection within 21 days: the last paragraph deals with any other case; the 21 days condition is eliminated, and the Quarantine Committee has the power to make the same order as before when the vessel has had an infectious disease on board, or has touched otherwise than by signal at an infected port, more than 21 days from the date of her arrival at Mauritius. The article therefore confers upon the Committee the most ample powers to apply the disinfecting remedy to every possible case—to those of great gravity as well as to those of less importance—and, as I have already said, it may exercise its powers independently of, and posterior to, the period of quarantine which is limited to 21 days from the last death or from the touching at the infected port. I may now state in more succint fashion what are the broad principles which the law lays down as to disinfection. It may be ordered after the quarantine period has, and is altogether independent of it: pratique may be suspended until the vessel has been disinfected: the cargo cannot be landed until it has been disinfected: the Quarantine Committee has a right to order such disinfection of the vessel as in their view is complete: to this end they may order the holds to be disinfected after the cargo is got out of them, and to delay pratique until this can be done. But they have no right to order that the disinfection of the ship shall be delayed until after the disinfection of the cargo, and thus to delay pratique until the cargo has been disinfected. If such an order were given it would, I think, be bad; and such an order has been given in the present case. It must seem strange—I must appear to contradict myself—when I say that I cannot at once come to the conclusion that this order is bad. There is another point which arises of the most puzzling description which was incidentally referred to during the argument.

The order has been given from the necessity of the case, and the question of very great difficulty arises whether this necessity is sufficiently strong to turn illegality into legality. It must be apparent that, if the view I take of the law is the correct one on the practical working of it, there is a link missing. By law the cargo cannot be landed until it is disinfected.

Where, then, is the disinfection to be carried on? On the ship? But then you must either give a ship pratique after her holds have been disinfected as the law allows, but while her infected cargo is on her decks and its disinfection not yet completed (because disinfection of the cargo takes a much longer time than the disinfection of the holds of the ships), or else you must delay pratique until the cargo has been disinfected and the ship thereafter disinfected, which the law does not allow. The practical answer is that in order to prevent undue delay of the ship—and undue delay is equivalent to illegal delay—the Government is bound to adopt the well-known measures of providing a disinfecting station or a pontoon; the cargo can be rapidly got out of the ship, and the disinfection of the vessel need be delayed no longer than is necessary to get the cargo out of the holds—a delay which, I think, is a legal delay. But then comes the question—the Government has not done this; the action is not, strictly speaking, against the Government for its own default, but against the Government in respect of the acts of its delegate—the Quarantine Committee. Is it possible to say that the Committee having only made such order as they were able to make in view of the quarantine arrangements provided by Government, the order is justified by the necessity of the case, and that otherwise illegal it becomes by this circumstance legal? I cannot think that this is possible. The ship is entitled to pratique after the legal periods of delay have expired: after quarantine, if there is no further order as to disinfection: after disinfection of the vessel if there is an order as to disinfection. But the law does not say that she must wait for pratique until her cargo has been disinfected; it seems to me to say precisely the opposite. The necessity then under which the Quarantine Committee acted was a necessity of the Government's own creation; and I cannot doubt that the resolution of the Committee is tainted with illegality on account of the Government's own neglect to take all those precautions which are necessary to make the quarantine law workable, and which they fail to take at their peril—the peril of making good in money the delay to which the ship has been subjected—a delay which finds no warrant in law.

Having thus examined the law I pass to the resolutions come to by the Committee in order to apply the law to them. If the analysis of the law was difficult on account of its too great conciseness, the analysis of the resolutions is doubly difficult from opposite causes. I am afraid I can find no words which would express at the same time the respect which we must all feel for gentlemen who devote their time to public duties, and my feelings after reading and re-reading this series of resolutions some twenty or thirty times. We are however spared a too minute analysis of them, as according to the view I have taken of the law they all rest on a groundwork of illegality—the order to disinfect the cargo on board-ship, the disinfection of the ship after the cargo has been disinfected, and the postponement of pratique until this disinfection has been completed. There are one or two points however which it is necessary to notice. Resolutions 1 and 2 deal with the quarantine period, and I do not think that any question arises with regard to them. Resolution No. 3 contained the following order: "That after the fumigation and cleansing of the vessel as provided by Regulation 198 of 1888 and the washing and disinfection of the clothes and effects of the crew, the following goods be allowed to be disembarked," etc. Then Resolution 4 of the 28th May runs as follows: "That on the return of the S.S. 'Donar' from FlatIsland, the measures of disinfection already ordered be at once carried out—that the vessel be not admitted to pratique until after the disinfection of its cargo." The measures of disinfection referred to in Resolution No. 4 are therefore those measures of disinfection prescribed by the Regulations of 1888 with regard to the vessel. The first four articles of the regulations refer only to the between decks, forecastle, and other parts of the vessel used either for shipping or other purposes by native passengers or crew. It prescribes the burning of sulphur and the washing of the woodwork with a solution of carbolic acid. These articles refer only to the fumigation of that part of the ship which is used by the persons on board, and not to that part of the ship used for cargo: the second chapter of the regulations deals only with the disinfection of the cargo but not of the holds. The hypothetical case referred to in the first part of my judgment therefore does not arise at this point, because there is so far no order to wash the woodwork of the holds. We have therefore an order that the vessel, although she may have been disinfected in accordance with chapter I of the regulations, shall not be admitted to pratique until after the disinfection, etc., of the cargo. There is so far no pretence of disinfecting the holds of the ship, but a bare order that the ship shall not have pratique until her cargo is disinfected, and this is, as I have already held, a bad order, not warranted by article 32 of the law. But the other resolutions must be examined because there is a series, and it is very doubtful whether the Resolution No. 4 represents the final decision of the Committee. Resolution No. 5 of the 29th May says that "after the vessel has been fumigated she may come between the two forts to disembark the goods mentioned in Resolution No. 3 after they have been disinfected, and that the vessel is to return to the outer anchorage to fumigate the rest of the cargo." Here again we have the fumigation of the cargo ordered on board the vessel and again pratique suspended until it is done. Resolutions 6 and "6 modified" of the 1st and 2nd June, come to after a protest from the captain that the carrying out of the Resolution 5 would involve a general shifting of the cargo, which might probably cause the vessel to turn over and sink, seem to express the view that the Committee could not consider such details and washed their hands of the matter; they said that it was for the captain and Government to agree between themselves as to the necessary means for carrying out the decision of the Committee. Perhaps it would be better to pass by those two resolutions without further remarks. But I cannot do so. The legality of all the resolutions is challenged, these two among the number. If they are not illegal in themselves, and apart from the others, they are perilously near it. If the fumigation had been carried out as insisted on by the Committee and the vessel had turned over, I will not say that the Government would have been liable, but the questions involved in determining whether the Government was liable or not would have been fraught with the greatest difficulty. I fail to understand the attitude taken up by the Committee—the attitude of severing themselves from the Government. The Committee is entrusted by the Government with important administrative duties, and in this respect it forms part of the Government of the colony. It has duties to perform alike to Government and to the community; it has to consider the commercial as well as the sanitary interests of the colony; if, in its opinion, there are things wanting to make the quarantine laws which it has specially in charge work smoothly and without danger, it is its duty to advise Government on the matter. The stand-off attitude with regard to the interests both of the shipowner and of the Government is an unwarrantable one, and one which might make the administration of the quarantine laws an impossibility. In all that I have said in the first part of my judgment as to the default of the Government in not providing means for carrying out the provisions of the quarantine laws, I must be considered to mean the Government by its advisers on quarantine matters—the Quarantine Committee. In that part of my judgment I have only dissociated the Committee from the Government for the purpose of the "Donar" resolutions, but not in any way for the purposes of the general administration of the quarantine laws. In Resolution No. 7 of the 3rd of June this stand-off attitude was abandoned (Resolution No. 6 had been disapproved by the officer administering the Government). If it was found absolutely impossible to disinfect the cargo referred to in No. 3 at the outer anchorage, the "Donar" was to be allowed to come between the two forts to do so. Then comes an important paragraph—the first reference to the disinfection of the holds—"that before coming between the two forts the holds of the steamer shall be opened, aired, and fumigated as far as possible." Then comes the Resolution No. 8 of the 17th June. After disinfection and disembarking of the cargo mentioned in Resolution 3, the remainder of the cargo was to be similarly dealt with while the steamer was between the two forts; and finally there is this paragraph, "that after disembarkation of all goods on board, the S. S. 'Donar' be thoroughly fumigated before being admitted to pratique." Resolution No. 9 of the 18th June seems to be what it was intended to be, namely, provisions for carrying out Resolution No. 8. Resolutions 4 and 5 are, as I have said, illegal, because they simply suspend pratique until the cargo has been disinfected. In Resolution 7 the order is changed—the holds are to be disinfected after the cargo had been got out of them; but there is the ever-present order to disinfect the cargo on board the ship, and the consequent suspension of pratique until the cargo is disinfected, and this finds its final form in Resolution 8, that after the disinfection of the cargo, that is to say on board the ship, the whole ship is to be thoroughly disinfected, and after that pratique. This is the order which I have said may have been compelled by the necessities of the case, but the illegality of which is not justified thereby.

On the preliminary point of law raised by the Government, the defendant in this action, the Court is unanimously of opinion in the first place that the paragraphs of the declaration in which it is alleged that the fumigation and disinfection of the vessel should have taken place within the quarantine period are bad. In the second place that the paragraph of the defence in which it is alleged that pratique was lawfully suspended until the cargo was disinfected is bad, and the parties will amend their pleadings accordingly.

Judge John Rouillard. The following is the judgment delivered by Mr. Justice John Rouillard in the above case :—

The point which the Court has to decide at the request of the parties, and for their convenience, before the merits of the case are gone into, is whether it was legal for the General Board of Health, under article 32 of Ordinance No. VI of 1887, to withhold pratique from the steamer "Donar" after the expiry of the period of 21 days' quarantine to which she had been subjected until the ship had been fumigated and disinfected, and until the cargo and other effects on board that steamer had been disinfected. It is understood that beyond certain facts which are admitted by both parties, we have now to consider whether other facts, supposing them to be true, can affect the present case. The law on the matter submitted for our consideration is to be found in article 27 and following of Ordinance VI of 1887 and article 3 of Ordinance V of 1890. Articles 27, 28, 29, and 30 of Ordinance VI of 1887 enact in substance that when a contagious disease has existed on board a ship within 21 days of her arrival, or when a ship has within 21 days of her arrival communicated with an infected place, the ship shall perform quarantine. That quarantine varies according to the disease with which the vessel may be supposed to be infected, but its duration in terms of article 43 of Ordinances VI of 1887 and VII of 1893 in no case exceeds 21 days. Articles 29 and 30 of Ordinance VI of 1887 have no importance with reference to the present case. Article 31 of Ordinance VI of 1887 is repealed by Ordinance V of 1890, which enacts that, when a vessel arrives from a port in the Straits Settlements or China, the Board of Health may order, whether the port be infected or not, that the passengers be put in quarantine for any time not exceeding 21 days from the departure of the ship from any such port, and that before the passengers are landed or released from quarantine their clothes be disinfected. The steamer "Donar" having left a port in the Straits Settlements on the 6th May 1896, and that port being a port infected with cholera, the quarantine of 21 days to which the steamer was subjected was perfectly legal. But on the 28th May 1896 a resolution was passed by the Board of Health to the effect, first, that the vessel should not be admitted to pratique until after the disinfection of certain goods forming part of the cargo, and second, that other goods not included in the preceding order should not be landed until further decision of the Board. That order of the Board gave rise to serious opposition from the captain of the "Donar," who alleged that the shifting of the cargo for the purpose of carrying out the order of disinfection whilst the ship was practically in quarantine would be a cause of great danger to his ship. A further order of the General Board of Health was issued on the 12th of June to the effect that after disembarkation of all goods, the steamer "Donar" should be thoroughly fumigated before being admitted to pratique. As a matter of fact, the steamer "Donar" was not allowed pratique till the end of the month of June, hence the present action against the Mauritius Government for having unduly kept the steamer in quarantine in violation of the laws of the colony. It was at first contended by the learned counsel for plaintiff that inasmuch as the laws of the colony did not allow the Board to impose, in the case of ships coming from the Straits Settlements, a quarantine of more than 21 days, the fumigation and other measures taken for cleansing the ship and disinfecting the cargo and the effects of the passengers ought to have been carried out within the 21 days, otherwise the quarantine would *de facto* have been prolonged beyond the 21 days; contrary to the positive enactment of the law. That point was however practically abandoned, and rightly so. So long as a ship is undergoing quarantine every communication with her is forbidden; how then could measures such as the fumigation of the ship and of the effects of passengers be carried out. An enactment according to which immediately after the expiry of the quarantine period certain sanitary measures, which cannot last more than a few hours, are taken previous to pratique being given is one which is justified *ex necessitate rei.* The difficulty therefore does not lie there, but in the interpretation of paragraph 1 of article 32 of Ordinance VI of 1887, which runs as follows :—" In cases coming under articles 27 and 28, the Board may further order that before the vessel is admitted to pratique, the said vessel shall be fumigated and disinfected in such manner as the Board shall direct, and that articles or goods likely to introduce into the colony the disease with which the vessel is infected shall not be landed until such articles or goods have been disinfected." The last paragraph of the same article proceeds to enact that the Board may in any case make a similar order when a vessel comes from an infected place. The construction which the learned acting Substitute Procureur-General put on these enactments is that the words " before the vessel is admitted to pratique " apply to the two sets of measures prescribed by the article, namely, 1o, the fumigation and disinfection of the ship, and 2o, the disinfection of certain goods and effects contained in the ship. After due consideration I hold that interpretation of the article to be inadmissible. The words used are : " The Board may order 1o, that before the vessel is admitted to pratique the ship shall be fumigated, and 2o, that certain goods shall not be landed until they have been disinfected." The article as it stands is perfectly intelligible. To hold that the words " before the vessel is admitted to pratique " govern the two paragraphs beginning by " that " would be going against the rules of grammatical construction of phrases. It was however urged that, in the hypothesis of the Court giving this last interpretation to article 32, Ordinance VI of 1887, yet the Board had not exceeded its powers, because article 32, above cited, simply directs that after quarantine and before the ship is admitted to pratique it shall be fumigated and disinfected " in such a manner as the Board shall direct "; but article 32 does not precise the time and manner in which the fumigation and disinfection shall take place, leaving thereby the fullest discretion to the Board of Health. The inference was therefore drawn that the Board of Health can legitimately, within its discretionary powers, direct that the fumigation and disinfection of a ship shall not take place until the articles or goods likely to introduce a disease into the colony shall have been disinfected and removed from the ship. This is exactly what took place in the case of the " Donar. " I unhesitatingly repudiate that interpretation given to article 32 of Ordinance VI of 1887. If it was the true interpretation of the article, it would mean that although Ordinance VI of 1887, article 43 enacts that vessels in quarantine shall remain in quarantine for various periods not exceeding 21 days, yet it shall be within the discretion of the Board, by prescribing measures of fumigation and disinfection as to which there can be no control, to delay indefinitely the period at which pratique shall be given to the ship. This is practically abolishing all the laws established, not only for the prevention of disease in the colony, but for the protection of persons with whom the colony has commercial dealings. The consequences of what I consider to be an erroneous interpretation of the article would be far-reaching, for not only would ships arriving in Mauritius within 21 days from the date of their leaving an infected port be liable to measures of fumigation and disinfection the duration of which would be left to the absolute discretion of the Board, but the same arbitrary powers would be given to the Board of Health, under the last paragraph of article 33, Ordinance VI of 1887, in the case of any ship coming from an infected place, whatever the length of the voyage from that place to Mauritius. This is tantamount to enacting that the powers of the Board of Health in these special cases are unlimited. It has been argued that there was a difference between quarantine and the refusal to admit a ship to pratique. Theoretically speaking, there may be some technical difference. In practice there is none, and whether the Board puts a ship in quarantine or refuses to admit her to pratique, it means absolutely the same thing. Much has been said on the point that unless the cargo of a ship is removed, the ship cannot be properly fumigated or disinfected. This is perfectly true. A ship which is emptied of everything which it contains can be much better fumigated and disinfected than whilst it is more or less full of cargo. But the completeness of this fumigation is only a question of degree. Can any one pretend that the fumigation of a large ship can be performed, even after the removal of the cargo, so as to render the ship and all its belongings absolutely free from any germ of disease? It is therefore more rational to hold that the true meaning of article 32 of Ordinance VI of 1887 is that the Board of Health should have the power to take certain measures which, whilst not interfering in any appreciable manner with private rights, might in a certain measure give to the colony additional security against the introduction of disease. I have here to remark that the disinfection of a ship seems to me of much less importance, in so far as the health of the colony is concerned, than the disinfection of the cargo. The fumigation of a ship may act as a protection to those who dwell in the ship, but in a far more remote degree to the inhabitants of the colony, especially when she is to leave the colony after taking cargo.

Little objection can be taken against article 32 of Ordinance VI of 1887, as I hold that it must be understood. When a vessel has passed through the period of quarantine determined by law, it is fumigated. The regulations of 27th March 1888 indicate fully how the fumigation and disinfection are to be performed. It is to be remarked that these regulations do not contemplate the disinfection of a ship after the cargo has been removed. This disinfection, as the regulations point out, is only a matter of a few hours. Then pratique is given and the cargo of the ship is landed, with only this difference, that the cargo is disinfected *au fur et a mesure* as the goods are taken from the ship. This is intelligible. What I consider unintelligible and impracticable is that a ship which has completed her quarantine of 21 days should be refused pratique and should be ordered, whilst practically in quarantine, to shift its cargo, thereby incurring the risk of capsizing and endangering the safety of its crew and passengers. If the law was as the defendants contend that it is, why is it that there was not the slightest permanent measure taken in the way to lighters, pontoon, place of deposit or otherwise, for removing a cargo without danger to the ship whilst pratique is suspended? This is to me tangible proof that the theory of being able to keep indirectly vessels in quarantine for an indefinite period is of recent origin. The legislators never gave that power to the Board of Health nor meant to give it. But the most powerful argument in favour of plaintiff's theory is article 32, itself taken in connection with the preceding articles. These articles prescribe in certain cases a quarantine not exceeding 21 days. Then comes article 32 which enacts that before the vessel is admitted to pratique the ship shall be fumigated and disinfected; the article next provides that before being landed the goods shall be disinfected, but does not say anything about admission to pratique. Is it not apparent that article 32 contemplates a series of operations of which the disinfection of the ship is the preliminary one, and that the landing of goods is to follow, but on condition that the goods be disinfected? The order not to give pratique to the "Donar" until the cargo had been disinfected was therefore in my opinion illegal.

Opinion of the English Press of the Colony—"Merchants and Commercial Gazette."

"Whatever else Mr. F. T. Piggot may be, in the civil cause *The Captain, and Owners of the 'Donar'* v. *The Colonial Government*, he has proved himself to be a painstaking Judge. Not that it required any very great amount of legal acumen to come to the decision arrived at, but, in delivering his judgment, Mr. Piggot laid down the correct reading of the law in so lucid a manner that even the members of the Quarantine Committee can scarcely fail to be convinced of the errors they have made.

"A little knowledge is a dangerous thing, and the assumption of legal knowledge, when none exists, is still more dangerous. The Quarantine Committee cannot be absolved from censure for plunging the country into an expenditure that it is ill able to bear, though the gravity of the responsibility is modified by the subsequent action of the Government in endorsing its views. On the other hand, the legality of the several resolutions adopted by a majority of the Committee was not only questioned, but the illegality was clearly pointed out by the Honourable Mr. Stein at the time the resolutions were passed.

"The country appreciates the solicitude that evidently exists in the minds of the members of the Quarantine Committee to preserve it from danger; but it cannot endorse the unorthodox steps they take in trying to put their good intentions into practice. A majority of the Committee felt it incumbent upon themselves to pass certain resolutions; but in doing so they neglected to count the cost, and troubled themselves but little as to what the consequences of their new regulations would be. When one member was asked how he proposed to have them carried out, his reply was to the effect that the Quarantine Committee was there to make laws; it was the duty of Government to enforce them.

"The time has come when the members of the Quarantine Committee must put aside the rôle of amateur legislators. Laws exist for their guidance, and were not made to be elastic to suit individual or collective crochets; furthermore, we would point out that the same laws were also made for the observation of the Procureur-General or his substitute."

CHAPTER IV.

SEYCHELLES ARCHIPELAGO.

BY MRS. E. H. EDWARDS, AUGUST 1893.

"WHAT a spot in a world of waters it looks on the map!" Such was the remark made by a friend of mine on hearing of my projected departure thither now more than ten years since.

It certainly does look like an oasis in a desert of sea; for the Archipelagos of the Indian Ocean cannot compare in number with those of the Pacific. Yet small and insignificant as the little group of islands may appear to the uninterested, they are the centre of as much life, as much love, and as much hope to their inhabitants as the most important Crown colony in the world.

The Archipelago is, I believe, so little known generally that many may not even be aware that it is an English possession, captured from the French in 1794, and finally ceded by the treaty of 1814. I have been able to obtain a copy of the "Treaty of Capitulation," which is not without interest.

COPY OF "TREATY OF CAPITULATION" OF SEYCHELLES, 17TH MAY 1794.

Jean Baptiste Queau Quincy, Capitaine au régiment de Pondichery, No. 107, Commandant Militaire et Agent Civil pour la Republique Française aux iles, Mahé ou Seychelles, Praslin et autres adjacentes propose la Capitulation suivante au Commodore Newcome, Commandant l'Orpheus, pour sa Majesté Britannique La division, et l'expédition particulière composée du Centurion, Capitaine Osborne et de la Resistance, Capitaine Parkenham, d'après sa nomination en date du 16 Mai 1794.	**Henry Newcome, Captain of His Majesty's ship *Orpheus*, and senior officer of His Britannic Majesty's ships employed on a particular service, &c., &c.**
ARTICLE 1.	**ARTICLE 1.**
La colonie, place, et la batterie de l'iles Mahé ou Seychelles, Praslin et toutes ses dépendances, se rendront au Commodore Newcome le 17 Mai de present année, à neuf heures du matin. La garrison Anglaise s'emparera des postes, batteries, bâtiments civils, et le pavillon anglaise sera hissè sur la place.	**I shall take possession of the colony of Mahé and its dependencies.**
ARTICLE 2.	**ARTICLE 2.**
La batterie de la place tirera trois coups par pièces, à boulet; il sera fait trois décharges de mousquiterie avant d'amener le pavillon Français.	**Agreed.**
ARTICLE 3.	**ARTICLE 3.**
Les proprietes des habitants seront très respectées; il ne leur sera causé aucun trouble, ni dommage dans leurs biens, meubles, immeubles, vaisseaux, marchandises, esclaves, et dans leur personne en aucune manière.	**Private property shall be protected. The inhabitants and their slaves shall remain unmolested. I take the brig *Olivette*.**

Article 4.	**Article 4.**
Les batteries, munitions, canons, magasins, tous les bâtiments civils et effets appartenant à la Republique, ne seront point touchés ; le tout restera dans l'état actuel.	The cannons, military stores and effects belonging to the Republic in their magazines shall remain at my disposal. The public buildings shall be preserved. The two small pieces carrying two pounds ball shall only be permitted to remain on the parade facing the Governor's house for the purpose of making signals in case of insurrection amongst the slaves.
Article 5.	**Article 5.**
Le Commandant Militaire et Agent Civil, ne sera point fait prisonnier de guerre.	He shall be prisoner of war during my stay only.
Article 6.	**Article 6.**
Les régistres, papiers utiles aux citoyens habitants, et ceux de la Republique, pour la comptabilité, seront respectés, non visités, etant intéressant pour les familles et pour état, que des choses nécessaires soient conservées.	Agreed.
Article 7.	**Article 7.**
La dite capitulation faite de bonne foi, sera garantie par la signature du Commodore Newcome, et signée par le Commandant Militaire et Agent Civil, et par trois citoyens des Seychelles représentant le corps des citoyens des iles Mahé ou Seychelles et Praslin.	Agreed.
Fait à Mahé, ile Seychelles, le 17 Mai 1794.	Done on board His Britannic Majesty's ship *Orpheus* in the roads of Mahé or Seychelles, the 17th day of May 1794.
(Signé) J. B. QUEAU QUINCY.	(Signed) HENRY NEWCOME.

Since the treaty Seychelles has been a dependency of Mauritius, and, despite occasional agitation towards independence, will continue to be so, mainly owing to the fact that the inhabitants are so closely allied by ties of relationship that no convicting jury could be empanelled until within the last twelve months. Capital crime could not be tried locally, but a compromise has been recently effected by the enrolment of such of the inhabitants qualified to serve, who are termed assessors. They with the judge adjudicate such cases, an appeal to Mauritius always being open. Serious criminal cases are not frequent ; but the people are as human here as in other parts of the globe, and considerable laxity prevails in the islands, the native police being always ready to screen their friends and relations. There are about thirty-three islands in the Archipelago, one-half of them inhabited, the remainder being merely rocky excrescences with little or no vegetation thereon.

Coral reefs abound in these waters. The islands themselves are of granite formation and bear numerous indications of volcanic action in years gone by, the rocks in many places, several hundred feet above sea level, showing on their rugged surface unmistakable evidence of the action of the waves. Rocks are a distinctive feature of the islands, but vegetation is very prolific, and the fertile beauty which meets the eye on nearing the Archipelago is a most enchanting sight, especially to those who have last looked upon the barren, treeless shores of Aden.

Mahé is the largest and most important of the group, being between twenty and thirty miles in length and about seven miles across in the widest part: its highest point is "Morne Seychellois," 2,800 feet above sea level. Although it presents a singularly steep and precipitous appearance as viewed from the harbour, the luxuriant tropical vegetation which descends to the very water's edge, and its dark forest-clad heights, far from suggesting a forbidding aspect, can but evoke admiration little short of fascinating in the minds of all true lovers of Nature. I have travelled in various parts of the world, but never has the scenery of any country appealed so strongly to my love of the beautiful as that of these charming islands, where Nature reigns supreme and runs wild at her own sweet will,—over towering rocks and heights; amidst deep, dark gorges and chasms; through forests of capucin and cedar,—here the orchid and the pitcher plant climb the mountain sides and wild cinnamon springs up in greatest luxuriance.

Visitors passing to and from Australia frequently inquire for the "Botanical Gardens." My husband's invariable reply is, "You are in them now"; for the flora of Mahé justifies its being characterized as "a vast Botanical Garden." Such a garden, however, in a country which affords ample facilities for the arrangement of one is a desideratum; with a little support and encouragement from the Government, it would commend itself to residents and prove a source of attraction to visitors.

In its formation and future conduct care must be taken not to "tread on the toes" of the planters by in any way competing with them in either local or foreign markets. A garden situated in an accessible position, devoted to the culture and sale of economic plants and embellished by the natural flora of the islands, would stimulate agriculture and provide an attractive resort for those whose avocations necessitate the leading of a somewhat sedentary life. This might be done with but little expense to the country; a large outlay, attractive though the project may be, is at present undesirable.

An almost unbroken silence prevails over the hills; for of animal life Seychelles is singularly destitute. The tiny brilliant "cardinal," scarcely larger than a wren, glints like a scarlet fruit through the leaves of many a tree and shrub, and the white-winged "goéland" darts swiftly through the forest trees with a peculiar discordant cry, while the cooing of a wood-pigeon may at times be heard. The pretty "tourterelles" flock tamely to one's door step, and the impudent "martins" call to each other with as much assurance as home-bred rooks. But there are no songsters in these tropical woods, and the sportsman may walk far and wide in search of game and return empty-handed at the end of a day's ramble. Flying foxes are occasionally to be found, and the "tangue," an animal bearing a resemblance to both a rat and a hedgehog, commits serious depredations amongst fruit and vegetables. Bats are very abundant and destructive, and the same insects, with the exception of butterflies, which are rare, are found here as in other countries in a similar latitude.

Almost every tropical product would grow if cultivated, but vanilla planting has been the main industry of late years. Coccanuts were formerly the backbone of the country, but owing to neglect disease has appeared and decimated the plantations. There is a small quantity of cocoa and coffee grown, and cloves are also an article of commerce; but although cinnamon grows wild in profusion, and pepper and nutmegs might be produced to advantage, the average Seychelles planter is not sufficiently enterprising to embark in new industries, or to in any way deviate from the stereotyped path of his forefathers.

What with the rhinoceros beetle amongst the cocoanuts, rats in the cocoa, disease (character unknown) in the vanilla vine, and "Hemulia vestatrix" on the coffee, a planter's life is not "a bed of roses"; yet, with all these drawbacks, by exercising care and economy, he is able to make "two ends meet," which desideratum cannot be obtained by agriculturists in all parts of the globe. Liberian coffee, owing to its hardy character and suitability to soil and climate, will doubtless in the future command the attention of imported blood and capital, even should it not commend itself to the lethargic habits of the Seychellois.

"Praslin," the next largest island to Mahé, about twenty-two miles distant from Port Victoria, is the home of the coco-de-mer or double cocoanut, a tree which is found in no other part of the known world. This peculiar palm and fruit possessed great interest for the late General Gordon, who, about ten years ago, spent some few months in Seychelles. So charmed was this good man with the beauties of these islands that he designated them "The Garden of Eden" and the coco-de-mer the "Forbidden Fruit." Miss North, when in Seychelles in 1883, made several paintings of the coco-de-mer tree and fruit, and these now hang amongst her other productions at Kew.

La Digue, a short distance from Praslin, comes next in size. On both these islands vanilla and cocoanuts are cultivated to no inconsiderable extent. Frigate Island, further seaward, is the scene of the principal rum factory in the Archipelago. The rum manufactured on this island is much appreciated.

Of the islands in closer proximity to Mahé, St. Anne, Ile au Cerf, Silhouette and Ile Longue are the most important, the last being set apart as a quarantine station.

Fruits grow equally well throughout the dependency and are exceptionally good of their kind. The orange, cœur-de-bœuf, or bullock's heart; corosole, or sour sop; avocat, or alligator pear; French and water-melons, guava, pineapple and banana are all unrivalled; but these are not sufficiently cultivated, even for the requirements of the country. Carriage and freight are so expensive that it does not pay to export fruit. This is probably why the Seychelles planter does not trouble himself to do more than supply the wants of his immediate household, the small surplus he might dispose of to his neighbours being scarcely worth the expense of sending round for sale.

Tobacco, manioc and maize form subsidiary crops. The first named is of exceptionally good quality, much appreciated locally, and by visitors who are so fortunate as to have it introduced to their notice. It is usually made up in carots weighing about 3lbs. each, and varies in price from Rs. 2 to Rs. 4 per carot. The climate for a tropical country leaves nothing to be desired. The average temperature is about 76 deg. Fah., and there is little variation between the two seasons.

During the rains, which commence about the end of October and continue more or less until the end of April, the heat is greater owing to the humidity or "mugginess" of the atmosphere; but the thermometer seldom reaches a higher degree than 82 Fah. Neither the rains nor the dry weather are persistent; the wet months average a fair percentage of fine days, and there is seldom too much drought in the dry season. The temperature on the whole is most enjoyable, and the weather little to be complained of. At an elevation of about six hundred feet above sea level the climate may be written down as "perfect."

In Seychelles we have a variety of the human race. There are no aborigines of the islands; the population is chiefly Creoles of French or African extraction; but there are besides several Mauritius and Bourbon families, numerous Malabar, Arab and Chinese traders, with a sprinkling of Malgaches, and a very small proportion of English residents.

The islands are but English in name; indeed, they are as much French as they were a hundred years ago. The language, manners and customs are emphatically French. French is spoken in the law-courts, where French law is also pre-eminent, and in the Government-aided schools English is taught only as a subject.

The census of 1891 gave the following return:—

General population as distinguished from African—	
Males	7,267
Females	7,419
African population—	
Males	1,754
Females	719

There is an English church at Port Victoria, and another at Anse Royale, both in Mahé. At Praslin also there is a good church and a resident clergyman. The Roman Catholic element predominates to a great extent, as is only to be expected amongst the large French population.

There is a Roman Catholic bishop (Prefet Apostolique des Seychelles), several Fathers of the "Capucin" order, a Mother Superior and Sisters of the order of "St. Joseph de Cluny," besides Brothers of the order of "Les Petits Frères de Marie."

Roman Catholic schools are established in many parts, and to them are extended by the Government the same privileges and grants as to those in connection with the Church of England. It is to be regretted that workers in the latter are, even amidst so small a community of its adherents, inadequate to carry on the education of the children and other parochial work. There is but one English lady to take the management of the girls' Protestant grant-in-aid school in Port Victoria, with more than one hundred children on the roll and only one paid Creole teacher, and but one English master, with an assistant Creole tutor, in the boys' Government school, the attendance of scholars being equally large.

The houses in Seychelles generally exhibit French taste in style and architecture. A few only resemble the comfortable Indian bungalow, with its rooms all on the ground floor, and shady verandahs around, the majority being built with an *étage* and balconies. Flowering creepers of every variety are prolific, and make the exterior attractive and picturesque.

Government House is merely a moderately sized bungalow, built chiefly of wood, with verandahs of stone-work covered with shingles. The surroundings are neat but of no extent; in fact, the *tout ensemble* is anything but what might be expected of a gubernatorial residence. Some day I hope to see the present building converted into Government offices, and a new presentable house built for the Administrator.

The Roman Catholic Cathedral in Port Victoria is, considering the resources of, and talent in, the country, worthy of the architect. It is of fair proportion and a well built edifice, and the convent where the daughters of nearly every respectable Creole family in the island receive their education, besides a large concourse of native orphans and other children unable to pay, is under excellent management and careful supervision. The evident sincerity and self-denial exercised by both Fathers and Sisters in their work is an example deserving imitation. Probably the court-house will remain the court-house for some time to come, as it is comparatively a new building. It is situated in Royal Street, above the Post and Printing offices, and may be described as a long, narrow barn, devoid of any attempt at embellishment or architecture. Adjacent is the gaol, but to the outside world nothing is visible beyond a blind wall.

Her Majesty's Treasury and Custom House, situated at the town end of the long Chaussée, under the same roof, are somewhat small and unpretentious in appearance. A large one-storied house, also in Royal Street, serves for a police station and mortgage office.

The only other building that might call for remark is that built some years ago by a company for the purpose of a fibre factory. This building is erected on a large piece of land belonging to the Government bordering on Albert Street. Several thousands of pounds were invested in machinery, and large boilers and steam engines were cemented into one wing of the building.

Subsequently the whole fell into the hands of the Government, and the premises and plant were leased as a soap factory for a term of years. The lease expired in June 1893.

Some "evil genii" evidently controls the action of Government. Certain it is, the fiat went forth, that upon no consideration would the buildings be relet; and, sad to relate, the whole of the machinery, boilers and engines have been ruthlessly torn from their bearings. It will be interesting to see if any unofficial member will call for an explanation as to why this valuable plant has been removed, and, if it has been sold, what has become of the money. The streets of Victoria are narrow, and the shops, or boutiques, with a few exceptions, typical of the owner who, in conformity with the law, hangs out a sign informing the public that he is a "consolidated dealer"; and consolidated indeed he is, salt fish and vanilla, soap and cloves, bread and onions, ironmongery and eggs, lying together in one heterogenous heap!

The ubiquitous Chinaman has, alas! found his way to Seychelles, which means that English and French, Creole and Indian, must "put up their shutters," and those who are not in a position to import their own household requirements must, in the future, expect their doctor's bill to be largely augmented. In a country so prodigal of Nature's gifts, it makes the heart feel sad to see the neglected and untidy condition of the cemeteries—"God's acre," the resting place of our beloved dead, which should be so suggestive of the beauty and verdure of a Paradise above. Those in Mahé are nothing but a wilderness of unsightly rocks and mounds, with a pitiful attempt made by the poor and ignorant at the embellishment of the graves which contain the remains of their departed relatives and friends. A vague idea of what such a spot should be has been implanted in their minds, and, with the true native love of outward decoration, the feeble comprehension responds readily to the promptings of an appreciative but uneducated imagination, the evidences of which are lamentably—almost ludicrously—apparent in the ornaments displayed upon many of the tombs and graves. Here and there a bouquet of flowers, arranged with considerable taste and regard to colour, is a refreshing change from the gaudy and broken vases, common plaster of Paris statuettes, and fragments of torn lace and ribbon, which mock rather than adorn the unevenly built tombstones and rough heaps of earth, contrasting so sadly in their ugliness with the neat grass-covered mounds to be seen in English country churchyards.

Life in Seychelles, particularly for English people, is of course very uneventful and unvarying; but, apart from the blessing of being exempt from the trying severity and changeableness of climate, which in England most undoubtedly marks the survival of the fittest, there are other compensations which tend to make existence endurable, if not desirable, to many, in this part of the world.

Where native labour is cheap life must naturally be easier to Europeans; and where a community is small, one's individuality is not so entirely lost as is the case in the struggling, seething mass of humanity around one in the mother country and many of her colonies at the present day. The rush of business, the hurry skurry of town life, the noise of unceasing traffic and innumerable factory wheels, the smoke from countless chimneys, the screech of the railway whistle, the misery and wretchedness which are never absent from crowded thoroughfares,—all these are conspicuous by their absence; and in an atmosphere untainted by smoke and squalor, and a country still comparatively free from the want and crime which reign paramount in the parent land, we pursue "the even tenor of our way," and if monotonous, still unclouded, by much which saddens life, even to the prosperous, unless they be utterly callous to the sufferings of their fellow-creatures.

To the Creole population, united as it is by the closest ties of relationship, existence is not by any means so uninteresting.

They are thoroughly French in feeling and ideas, *toujours gai*, if sometimes poor; they enjoy life as much as they can, making the best of circumstances, and they have a happy knack of persuading their servants to work, doing nothing themselves, a privilege envied by their English compatriots.

There is a good deal of *laisser aller* about the *ménage* of a Creole household, but a little of this might, perhaps, be introduced with advantage into the strict regimen of an English one, where the prevailing love of cleanliness and order in the habits of the British matron is not always conducive to the peace and quietness of the family generally.

Happily the dust and dirt which accumulate, one can hardly conjecture how, in the houses of other countries are things almost unknown in Seychelles, and the polished parquet to be seen in nearly every house gives an air of cleanliness and an appearance of comfort to even the most meagrely furnished apartment. What makes life easy to any resident here is that the actual requirements of a household are so few. Although provisions are not cheap, and, as in most tropical countries, bazaar supplies very inferior, the furniture and clothing that necessity demands are of a very limited and inexpensive character. Wages are low, so that cleaning, cooking and washing can be done at a very reasonable rate; and there being few opportunities for spending money on amusement, the inducement to do so is less than it otherwise would be. To a restless, pleasure-seeking mind, these quiet islands offer no attraction; but to those whose resources are in themselves and their own immediate surroundings, life in Seychelles presents a different aspect.

This part of the world has, in common with other countries, its superstitions and its folklore. Few of the natives would venture out after dark on the day of the "Fête des Morts," believing that the disembodied spirits would appear to them. This feast, which precedes that of "La Toussaint," is religiously observed; and, as on the continent, the cemeteries are visited by thousands, bringing their touching offerings of flowers and wreaths to place on the last resting-places of their dead.

Legends are told of weird apparitions as in the case of the "White Lady of St. Anne."

The island of "St. Anne" is situated about two miles from, and exactly opposite to, the N.-E. side of Mahé. Upon it there is a substantial residence, now more than one hundred years old, formerly inhabited by a family of French descent, one of the members of which was held in great abhorrence by reason of her cruelty to her slaves. In former times the proprietary inhabitants of Seychelles procured their labour supply through the medium of pirate vessels, no inconsiderable number making periodical visits to the East Coast of Africa, and returning with a live cargo of captured natives to be sold to the cotton planters. Since the emancipation of slavery this industry has perforce been abandoned, paid labour being too costly to make cultivation remunerative.

These slaves are said to have been treated with great cruelty by their Creole employers. In the case referred to her inhuman mistress is said to have had a poor slave girl beaten to death, and positively herself to have sat in the verandah of her house to witness the administration of the punishment, even ordering her dinner to be served there in order that she might feast her eyes upon the revolting spectacle without interruption. The ghost of this barbarian is said to haunt the place ever since her death.

"Long Island" has also some ghostly legend connected with it, and the wife of a late Chief Civil Commissioner assured me that she had herself seen and been extremely terrified by the apparition of the figure of a woman which rose out of the sea at a distance of some twenty or thirty yards from the shore, while she stood gazing from the verandah of the bungalow, whither she had repaired from her room, the night being hot, to enjoy a little fresh air. I am of opinion, however, that this may have been a vision of an excited imagination, as my informant's health was not good at the time, and the party had gone to Long Island for change and quiet. The servants, disliking the solitude of the place, circulated stories of its being haunted, which may have had an effect upon the imagination of their mistress.

The Creole mind lends itself eagerly to the adoption of many strange prognostications; as, for instance, a firm belief in the period of forty days as being a crisis in the case of illness or bodily injury, the wearing of a charm as a protection against many evils, and the prevailing notion that illness or evil can be worked by one person upon another by the exercise of some malevolent incantation, and at the same time the casting of a stick or leaf across the pathway of the individual upon whom the evil is to be wrought.

On every anniversary of the feast of St. Andrew the "bénédiction des bateaux" is performed and the day is observed as a universal holiday, all Government offices being closed. Throngs assemble at the appointed place—a part of the beach in the district called "Cascade"—to witness a rite in the efficacy of which they place the most implicit faith and confidence. The fishing boats and pirogues, decked with flowers and floating "pavillons," are drawn up in gala array as near to the shore as the state of the tide will allow, and, after mass has been said in the little leaf-covered chapel, the bishop and priests assemble round a large wooden cross, which is raised on an elevated part of the beach, and there the flotilla receives the blessing of the bishop and "aspersion de l'eau benite," while the respectful silence of the surrounding crowd testifies to its feelings of devotion and reverence.

Fishing is not only a pastime but one of the chief occupations of both native and Creole. Many families subsist almost entirely upon this commodity, which is both cheap and good. Turtles are also sometimes found and speared by the fishermen, but these are chiefly brought over in small sailing smacks from the distant island of "Providence" and kept in enclosed ponds near to the sea. They afford an almost constant supply of meat for the bazaar. The land turtle is also bred here and is extremely good eating, but is too much of a luxury to be sold as an ordinary bazaar supply. It is considered a very *recherché* dish, and is prepared to perfection by a Creole cook.

Bullocks are brought from Madagascar and are slaughtered once or twice a week; but the pasturage of Mahé is unsuited to these animals, and the beef in consequence is miserably inferior.

Mutton is rarely to be had, but pork is killed daily and is the meat most appreciated. Pigs are fed upon poonac, the dried refuse of the cocoanut after the oil has been expressed, so they are reared on almost every plantation, and the meat as a rule is very good.

Milch-cows are kept but require stall-feeding, otherwise the milk is very poor—in any case, it is produced in such small quantities that cream or fresh butter are luxuries unheard of. Of horses and donkeys there are a few, but as no attempt is made to keep any of the roads in a state of repair fit for driving on, these animals, for purposes of draught, are practically useless.

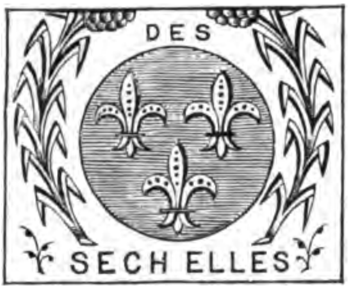
There are a few jinrickshas, lately imported by an enterprising Chinaman, available in or near the township for those who are prepared to run the risk of an upset. Travellers in the country ride on horseback where the state of "disrepair" or the gradient of the roads will permit; but as the latter does not appear (until the arrival of Mr. Pitot) to have entered into the consideration of the Superintendent of Roads and Bridges, a "point-to-point" race being evidently the one most approved of, most travellers prefer to pursue their journey *à pied* rather than risk their own or their horses' necks by attempting equestrian feats on a "one-in-three" bridle path. As an illustration of this, I may mention that one part of the road now in construction between Victoria and Port Glaud is so steep, that those who had built country residences in the expectation of having a good approach to them are now projecting the cutting of a new trace, which they may use with less peril and fatigue, the cost to be met by private subscription.

The authoress complains bitterly of numerous defects in official circles, and winds up with the following:—

That there is a prosperous future in store for the Seychelles Islands I have no doubt, provided existing conditions be altered. Their Augean stables must first be cleaned; the home authorities become more alive to their importance and not foster Government officials upon them, whose careers have been failures elsewhere; other means of communication must be provided, new blood and capital introduced, some local laws amended and others framed. Then the "Seychelles Archipelago" will occupy the proud position which, owing to its climate, soil and immunity from hurricanes it is capable of commanding, namely, that of the "Garden of the World" The island can now boast of an able Administrator in the person of Mr. Cockburn Stewart

The Pierre de Possession.

The "Pierre de Possession" was placed in its position by Capitaine Corneille Morphy, of His French Majesty's East India Company's frigate "Cerf" (after which the island in front of the harbour is named), on the 9th September 1756. The stone was probably "cut" in the "Ile de France," whence Mons. le Capitaine brought it over. The shield bears the Bourbon arms of France. Three fleurs de lis "or" on a field "azur"; the "azur" is expressed heraldically by parallel horizontal lines, and the "lis" dotted to show the glimmer of the gold.



The letters G. B. G. F. on one end of the stone are placed upside down with regard to position. The meaning of these letters I am unable to guess. "Sechelles" was spelt in this way by the then French Minister of Marine. The relic is purely historical, and may be termed a sort of stony title-deed to what General Gordon called the "Garden of Eden" and the late Mrs. Edwards the "Garden of the World." Not long ago a French General passing through Seychelles took a fancy to this souvenir of the French occupation of Mahé, and carried it off bodily to Marseilles on board the steamer by which he was a passenger.

It was promptly re-demanded by the Government of Seychelles and sent back. It is now erected in front of Government House, Victoria.

The illustration on the previous page purports to be but a rough sketch of the stone.

Mr. George Gordon McCrae, of Melbourne, has described it very fully, and traced its history with much patience and accuracy.

SAILING DIRECTIONS.

Recent examination of the western edge of the Seychelles bank shows that a nearly continuous rim of more or less shallow water extends from Bird Island to beyond the western point of the bank.

Dangerous shoals may exist in many parts of this rim besides those already known. Ships should avoid crossing it north of the fifth parallel of south latitude. Southward of this parallel there is, according to the scanty information existing, apparently a break in the rim. H. M. S. "Boadicea" in August 1892, passed over a patch of 7½ fathoms, with the north end of Denis Island bearing about N. 88° W., distant nearly 7½ miles.

Port Victoria, situated on the N. E. side of Mahé Island, is the principal harbour. It is enclosed by a group of islands standing on detached coral reefs. The position is easily recognised by the Morne Seychellois, the highest peak on the island, which stands 1½ miles S. W. by S. from the town. Vessels bound to Seychelles from the southward from 1st December to the end of April, when westerly winds prevail, should steer to pass east of Alphonse Island. Westerly winds will be met in 8° or 9° S. From Alphonse steer to pass about 25 miles east of Des Roches Island; then haul up straight for Silhouette Island, 2,473 feet high, pass close to it, when to the eastward of the island northerly winds are almost sure to be met. Being well to windward, a vessel will be able to lay across for Port Victoria. Steering straight for N. W. point would cause delay; in meeting the northerly winds she would have to beat around the point with head wind and, perhaps, adverse current. From 1st May to end of November, when S. E. trade winds prevail, steer to pass west of Agalega Island and east of Coetivy Island; then steer up to pass eastward of Point Capucin; then to the harbour. The object in passing west of Agalega is that the westerly currents are strong and may set a vessel on to the islands during the night.

Pilot—A Government pilot is sent out to vessels upon the signal being made that he is required.

Bearings all magnetic.

Outer Anchorage.—The first safe position will be found on the N. W. side of St. Anne Island in about 10 fathoms, with the north end of that island bearing E. N. E. or N. E. by E ½ E., and the south-west end touching the north end of the south-east island (off La Rue Point) bearing S. S. E. ½ E. The light-house from that position will bear about S. W. by W. ½ W., and may be approached on that bearing till the peak of St. Anne Island bears E. ½ N., when anchorage may be taken in 10 or 12 fathoms. The latter anchorage is within the two outer buoys. It is reported that there are coral patches in that vicinity required to be guarded against by sight from the masthead.

A more convenient outer anchorage will be found with the light-house bearing W. by S. and S. W. by W. ½ W. (distant three-quarters of a mile), and the west extreme of Cerf Island S. S. E., the depth being 10 or 12 fathoms on sand and clay, a good holding ground, but there are several rocky patches.

As vessels are piloted into the inner harbour, it is not necessary to mention it here.

Light.—A light-house built of coral, 47 feet high and painted white, is situated seventy yards inside the north end of the extensive coral reef at the south side of the harbour channel. Care must be taken not to mistake the light-house for a conspicuous white tower situated on the mainland shore northward of the town.

A fixed red light, 37 feet above high water and visible nine miles, is exhibited between the bearings of S. through W. to N. W. ½ N., except where obscured by the adjacent islands. A red sector of light is also shown over the anchorage in Port Victoria between the bearings E. N. E. and N. E. ½ N.

Buoys.—No. 1.—The outer buoy, with red and white chequered, and a conical structure on it containing a bell (the sound of which is not to be depended on). Victoria Light-house bears from it S. W. ¾ W., distant $1\frac{3}{10}$ miles, and Connan Point W. ¾ S. A red light is exhibited from this buoy when the mail steamer is expected.

No. 2.—A mooring buoy, painted red, is moored with the light-house, bearing W. by S. ¼ S., distant 5¾ cables, and Connan Point W. by N. ½ N. A white light is exhibited from this buoy when the mail steamer is expected.

No. 3.—A similar buoy, but chequered red and white, is moored with the light-house, bearing S. W. by W. ½ W., distant 5½ cables, and Connan Point W. by N. A red light is exhibited from this buoy when the mail steamer is expected.

No. 5.—A mooring buoy, painted red, is moored with the lighthouse, bearing S. W. by S., distant 2 cables, and Connan Point N. W. by W. ¾ W. A white light is exhibited from this buoy when the mail steamer is expected.

CHAPTER V.

RODRIGUES.

Sailing Directions.

See Wreck of Ship "Traveller," page 27.

An extensive flat coral reef encircles Rodrigues Island, varying greatly in distance from the shore. At the south-eastern point of the island it in only twenty yards from the shore; from the western end it extends 4½ miles in a southerly, 2¼ miles in a westerly, and 4 miles in a northerly direction.

The position of the reef is indicated by breakers, even in the calmest weather. The outer edge is tolerably steep-to except in a few places; but with the swell that generally rolls on to it the sea often breaks in 10 fathoms several hundred yards outside the actual shoal water. A vessel in light winds can anchor almost anywhere outside the reef in from 10 to 20 fathoms. The surface of the reef is even, and at low-water springs the major part is dry, most of the rest being covered only by a foot or two of water, leaving a few shallow channels, through which nothing but canoes can traverse.

There are several openings or passes in the edge of the reef at different points round the island. These passages are used by the fishermen to the deep water fishing grounds, and might be of great value to the crew of a wrecked ship if known. During the *ras-de-marées* (rollers), however, they are impassable.

At Quatre-vingt Brisans (Eighty Breakers), the south-west corner of the encircling reef, the edge is altogether broken up into detached patches, and in this part the breakers are heaviest.

A bank of soundings from 20 to 40 fathoms, bottom coral and sand, extends from the reef on the north side of the island for 3½ miles; on the east 6 miles; on the south 2 miles; and on the west side 12 miles. The bank is steep-to all around and falls suddenly into 200 fathoms.

Winds.—The S. E. trade wind is more or less continuous all the year round. June to October (inclusive) is the most settled weather, the wind blowing from E. to S. S. E. with a force from three to six but generally fresh. November to May cyclones may be experienced, and the weather during these months is unsteady. The wind veers round to the northward as far as north-east and remains there for some days. Calms also occur at this season, but are not of long duration. Rains prevail from December to April, and are heaviest in March.

Port South-East.

A large pass on the south-eastern side leads into Port South-east. The entrance, at a distance of 1¼ miles from the shore, is about 200 yards wide, and a few hundred yards outside there is a bar with depths of 4 to 6 fathoms, on which the sea breaks during *ras-de-marées.* Inside the bar the water is deep, but a rock on the eastern side narrows the entrance and throws a roller across occasionally. The pass itself is 130 yards broad and 1½ miles in length, deep and clear of rocks throughout; but the great velocity of the tides, the number of turns in the channel, and the ordinary strength of the wind render it inadvisable for a vessel under sail to make an attempt. No marks can be given for the entrance, but it may be clearly seen from aloft at a distance of one or two miles. Looking at it from one of the hills, it is the prettiest sheet of water I ever saw.

The harbour is small but well sheltered, being protected from any swell by the reef, has good holding ground of mud and sand, and would be a useful anchorage for small steam vessels. Hermitage Islet, small and rocky, stands in the centre of the harbour. Several low coral islands stand on the south side of the reef. To the westward is Crab Island, abounding with rabbits, goats, and guinea fowls. When the barque "Stanhope" was wrecked on the reef during the night some fifteen years ago, the crew found a pass and landed on Crab Island before daylight. The others are Katrine and Frigate, the neighbouring islets being high and basaltic.

Cocoa and Sandy Islands, to the north-west, are mere sand quays, with scrub and high cedar and cocoanut trees, easily distinguished from the mainland, which is bold and appears treeless 10 to 12 miles off shore.

Booby and Diamond Islands, to the westward of Port Mathurin Bay, are basaltic rocks 50 to 60 feet high.

There are several deep bays on the shores of the island, most of them with deep water; but as the reefs block them up, they are useless for anchorages. The communication of the island is carried on entirely by canoes, which can pass at all times, except at low water springs, by a shallow channel that exists nearly all round close to the shore. A ship's boat can only pass through these at high water.

Port Mathurin, the sole practicable harbour, lies on the north side, and is an excellent anchorage formed by a semi-circular inward curve in the edge of the reef. The holding ground is good, the bottom being sand and mud and very even.

To seaward the Bay is protected by a coral bank, with depths of one to 3 fathoms, named the middle ground, which stretches across the entrance, leaving channels to the eastward and westward of it; but as the wind during the greater part of the year is from the S. E. the island itself prevents the swell from being felt to any extent. There is room for a large fleet of vessels to lie at anchor in Mathurin Bay. The eastern passage is narrow and intricate, leading between coral heads which cannot always be seen; but a sailing vessel must enter by this passage, as the wind is usually too much from the southward to admit of her fetching in through the western passage. It is not at all impossible for a ship to work in through the western passage, but a stranger would run more risk by doing so than by taking the eastern passage. To enter by the eastern passage, bring Diamond Island in line with a notch in the hills at the western end of Rodrigues Island, bearing S. W. by W. ¼ W., and run in on that line until Mont Piton comes in line with a whitewashed cliff bearing S. ¾ W., when a vessel will be inside the reefs and may alter the course towards the houses of Port Mathurin. This course will lead in not less than 4½ fathoms, though very near to some patches of 2 fathoms.

The whitewash is on the most prominent and blackest cliff on the coast. Should it not be well kept the cliff itself is a good mark, and can easily be recognised when on the bearing indicated. The whitewash is one-third from the east end of the cliff. A buoy marking a 2-fathom's patch lies at the inner end

Note.—It is well kept by Government. Whitewash renewed yearly.

of the eastern passage, and, if used as a guide, must be passed close-to, leaving it on the port hand. The course by leading marks leaves this buoy 120 yards to port, and there will be a 4-fathom's head between the ship and the buoy.

Mont Piton shows as a sharp cone, and is quite unmistakable when near Mathurin Bay, but when seen from the eastward or westward it loses its conical shape.

The western passage is recommended for steam vessels and for sailing vessels going out, being wide and straight. The only danger to a large vessel is a 3-fathom's patch, which must be left to the westward.

A steam vessel approaching Mathurin Bay from the westward should not shut in Pointe de Sel with Point Corne, until Mont Piton is in line with the eastern and larger of the two flagstaffs in Port Mathurin bearing S. ¾ E.; steer in on that line until Booby Island bears W. by S.; then alter course to S. E. for the anchorage. Not less than 10 fathoms will be found on this track.

Leaving Mathurin Bay steer for Booby Island until Mont Piton is in line with the flagstaff; steer out on that line until Pointe de Sel opens off Point Corne. A vessel will then be clear of the reefs and can keep away to the westward; but, if going to the eastward, take care not to bring Booby Island to westward of W. by S. until the middle ground be passed.

The most convenient anchorage in Mathurin Bay is in 10 fathoms, bottom of sand and mud, off a small buoy marking the entrance to the creek, with Mont Piton in line with the cliff of Point Venus bearing S. ¼ W., and Point Manioc (the extreme of land to the west) showing inside Diamond Island.

Boats land at the upper end of the creek in Mathurin Bay at a small pier extending from the village during high tide, but they cannot get within 400 yards at low tide, and wading must be resorted to.

The flagstaff used as a leading mark is situated close to the beach, and the Union Jack is hoisted on it when any vessel is in sight.

It is high water, full and change, at Port Mathurin, at 0h. 30m.; springs rise 4½ feet, neaps 1½ feet.

There is a tolerably constant current passing the island setting to the westward.

The tidal streams are not appreciable except in the channels or passes.

Point Venus, a cliffy headland on the south side of Mathurin Bay, nearly half-a-mile to the eastward of Port Mathurin, is in Lat. 19° 40′ 23″ S.; Long. 63° 25′ E. (approximate). A stone hut, used by the party who observed the transit of Venus on 9th December 1874, marks the point.

Captain Slocum was delighted with his visit, perhaps as much so as Lady Barker.

The following is the exact copy of a letter from him to the *Maritime Register* of New York:—

MAURITIUS, 29*th September* 1897.

TO THE EDITOR OF THE "MARITIME REGISTER," NEW YORK.

DEAR SIR,

Having recently called at the Island of Rodrigues (Indian Ocean), I found a new state of affairs at the place, which I feel quite sure brother mariners would like to know of. Will you kindly report the matter in the *Register*.

Present sailing directories give strangers a bad impression of Rodrigues, and we must all confess that the experiences lately of the ill-fated ship "Traveller" would not inspire confidence or respect in any one seeking a port of refuge there. A new resident officer is in charge of the island, and a new doctor is even now on the way there. The new Governor or resident Magistrate has already built a reservoir that will be a monument to his memory. Ships may fill pure clean water at the jetty brought down in iron pipes from the mountains. Boats drawing not more than 3 feet may land at the jetty at all times, and boats drawing not more than 6 feet may land there at high water, full and change.

The outer harbour of Mathurin Bay, I may add, is safe for ships of any size, and the holding ground is good.

A pilot comes off upon the usual signal being made.

The "Spray," drawing 5 feet 6 inches, sailed into the inner harbour and at once alongside of the new jetty. When leaving she kedged out, the trade wind being E. by S. and fresh at the time, and the channel narrow.

Provisions of beef, game, vegetables and fruits are plentiful: for one shilling I bought as many citrons as two stout lads could carry from the hills of this mid-ocean land of promise to the sloop.

The same intelligent officer in charge who brought unpolluted water to the village also constructed a road over the mountain to St. Gabriel, 7 miles, and is pushing it on over the island.

No one should go to Rodrigues without visiting St. Gabriel, where the air is cool and bracing. There are never any fevers in Rodrigues, and no dangerous doctor that I know of now.

The medical officer of the "Traveller" fame was speedily removed or interdicted. I would strongly recommend any yachting party round the world to call at Rodrigues for a sight of the famous caverns, and for good shooting if they like it.

The present educated and intelligent officer, Mr. Robert, I can assure my nautical friends, and yachtsmen in particular, will speedily make offenders of humanity as scarce in Rodrigues as the extinct dodo, whose bones only are found there in the caverns.

AGALEGA ISLANDS.

THERE are two islands connected by a ridge or spit of sand about a mile in length, which dries at low water. The northern island is about 5 miles long and the other 6 miles; their extreme bearing from each other is N. W. by N. and S. E. by S. They are low, but closely covered with cocoanut and high trees, which may be seen at a distance of 15 miles. When bearing S. E. or N. W. they appear like one small island, but when at right angles to those bearings they show their full extent.

The islands are easily approached, as there are no outlying dangers: they are surrounded by steep-sided reefs attached to the shore, which extend further to the west than to the eastward, also a considerable distance off the N. W. and S. E. points.

There is a stone pier, boat harbour and flagstaff on the east side of the island near the settlement.

Anchorage.—The steepness of the reef renders it very difficult to find an anchorage. In 1857 H. M. S. "Frolic" anchored on a ledge on each side of the southern island in 10 fathoms, about two cables from the edge of the reef, and reported the bottom as being coral and large rocks.

Four mooring buoys are placed about 70 yards from the shore for the accommodation of vessels visiting the place. They are attached to large anchors; two buoys are intended to be ahead and two astern, the vessel being broadside to the beach with her head S. E. A vessel intending to use them should bring the flagstaff to bear S. S. W. and anchor in 7 fathoms, sand and coral; then haul in and secure between the buoys. The ship's stern will then be 50 yards from the pier and 20 yards from the edge of the reef. This position is very open and unsafe. A wind to the eastward of S. E. sends in a heavy swell, when a vessel will be better under way.

Pilot.—The coxswain of the surf-boat acts as a pilot, but may not be very competent.

Tides.—At the "Frolic's" anchorage the tide streams ran at the rate of one to three knots an hour, the first of the ebb with great velocity. The "Griffon" reported the tides to be irregular, and that correct information was not obtainable.

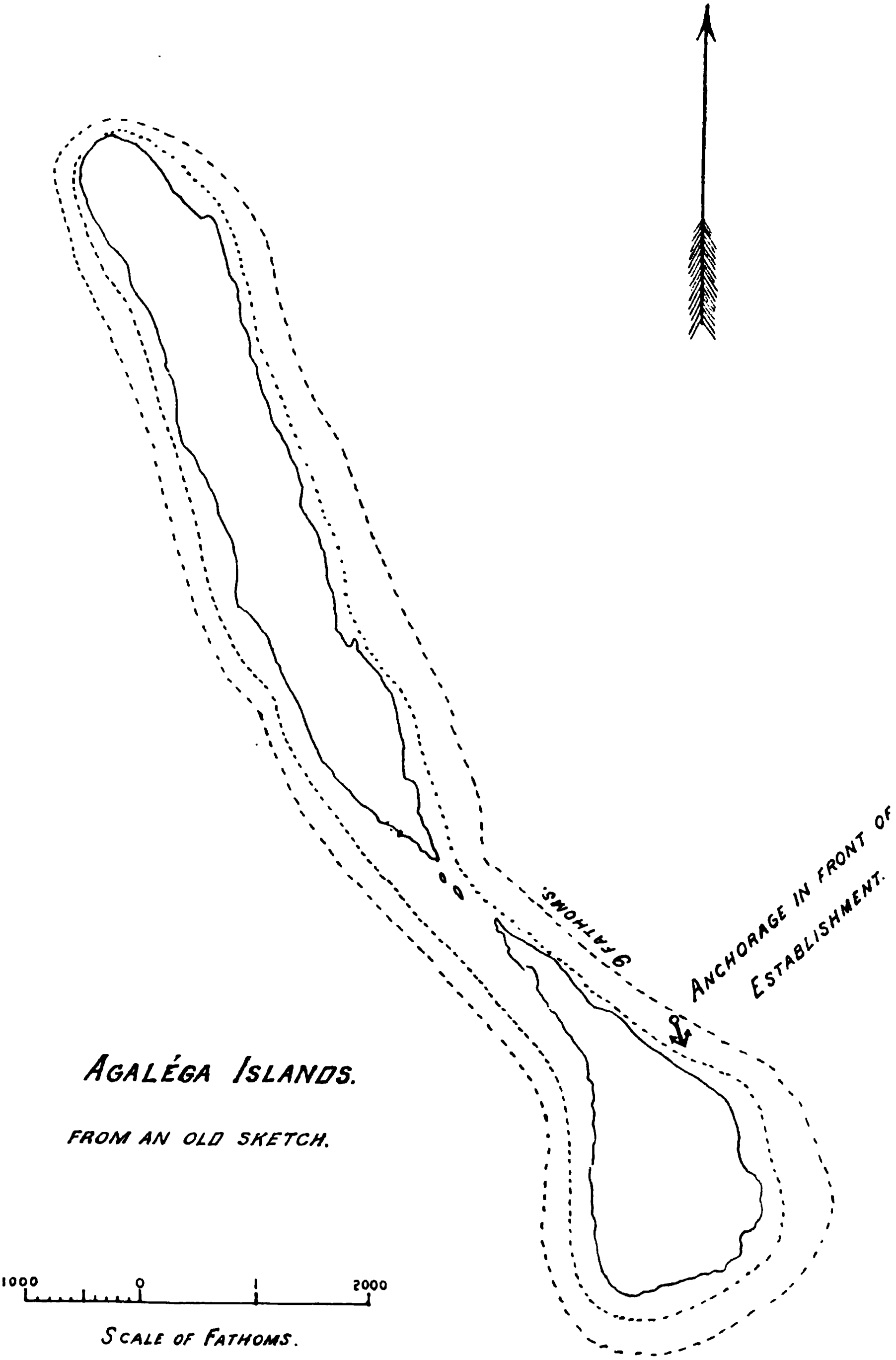
Wind.—The worst months in the year to be at the above anchorage are July, August, and September, when the S. E. trade is strongest and the swell comes more from the eastward.

Landing in ships' boats is dangerous, the channel through the reef being difficult at low water, but a surf-boat can be obtained.

According to accounts the northern island is 5 miles long and the southern 6 miles, but according to sketch the northern island is 8 miles long and the southern 4 miles.

SAILING DIRECTIONS FROM PERSONAL EXPERIENCE.

On approaching Agalega from June to September, if the sea is high, wait for a break about 20 or 30 miles to windward, even for a few days. When making for the anchorage, if the English Ensign is seen flying on the flagstaff, this is a signal to come on. If there is a heavy surf, a blue square flag will be hoisted, which means stand out to sea, keep off and on until the signal is given to come in. In closing in with the land go under easy sail, and when the pilot boat is seen steer direct for her, as she will be well to windward of the anchorage. When the pilot is on board he will put the vessel before the wind and furl all sails, which must be done with speed. When she is near the first mooring buoys, boats with a large hawser will come alongside, and a host of men will jump on board with the end and pass it round the mizen or main mast to check her. At the same time the anchor is let go, and perhaps both may be required. Such was my case, the first cable having parted. After she is brought up she is allowed to swing head to wind, sufficient chain run out, two large coir springs are passed up on each bow, and turns are taken around the windlass and their ends hitched to the foremast; the same for each quarter and round the main mast. These springs must be carefully watched day and night, slack hove in as they stretch and nips carefully parcelled; if they are allowed to touch the coral bottom while the ship is ranging about much, they are apt to cut through in a few hours. Between 1885 and 1890 the barques "Mathilde" and "Peggie Doy" parted and drove on the reefs and became total wrecks. The master of the latter vessel and four sailors were drowned and their bodies washed on shore within an hour after. This happened between noon and three in the afternoon. My visit was in July, one of the worst months.



AGALÉGA ISLANDS.

FROM AN OLD SKETCH.

BOURBON OR RÉUNION.

THIS island was discovered by Don Pedro Mascarenhas about 1545: it was then uninhabited by either man or beast. The French took possession of it in 1649 under the appellation of Ile Bourbon. It was known by that name until the French Revolution of 1848, when it was called Réunion. Until 1896, the year of the complete conquest of Madagascar by the French, it was their chief possession in the southern Indian Ocean. The island boasts of a volcano, the grand Brûlé, 8,613 feet above the sea. It generally burns without violent eruption or noise, and when in action it is visible at night a considerable distance from the island. Like most places steam communication predominates, St. Denis and Pointe des Galets being the chief ports of call. Vessels are conducted to other ports and anchorages of the island by pilots. These gentlemen are to be carefully watched, as the British steamer "Limpopo" and a Belgian steamer were wrecked in the nineties when in transport from one port to another.

ST. DENIS.

St. Denis, the principal town and seat of Government, stands at the northern end of the island. It is a port of great importance, connected by rail with Pointe des Galets.

SAILING DIRECTIONS.

Lights of the Coast: see Chapter on Lights.

As there are no off-lying dangers, no great precaution is necessary on approaching the coast. It is best to anchor during the day. Coming from the north at night keep off and on in the vicinity of Point Bel-air light until daylight; then set course for St. Denis. Upon the usual signal being made for a pilot, he will come off in a whaleboat with a flag at the bow.

Sides.—It is high water, full and change, at St. Denis at 12h. 22m.; springs rise 2½ feet.

In the cyclone season vessels must be prepared to put to sea at any moment.

Signals.—Vessels can communicate with the Port Office by means of the "International Code."

When boats are permitted to communicate with the shore, a white flag with a blue square in the centre is hoisted on the top-gallant yard of the Port Office flagstaff; if the hoisting of the flag be accompanied by the firing of a gun, it indicates that all vessels are to weigh and proceed to sea.

At night three lights shown at the gaff, accompanied by the firing of a gun, signifies "Prepare for weighing"; and four lights shown at the gaff, accompanied by the firing of a gun, signifies "Weigh and proceed to sea without delay."

PORT DES GALETS.

Information by Capitaine Lartigue of the Messageries Maritimes S.S. "Pei-Ho."

Lights.—The flashing light on Pointe des Galets is the only guide at present (1890); but it is in contemplation to indicate the limit of deep water on each side the entrance channel by a pair of lights with red and green shades.

The mooring buoy in the offing has a white light placed on it two nights preceding the arrival of the Messageries mail from Tamatave or Seychelles—at present on the 10th and 21st of each month.

Beacons.—The limit of the navigable part of the entrance channel is marked on each side by two pairs of beacons on the east bank of the outer port; they are made of sheet iron, surmounted by St. Andrew's Cross and painted white. Each pair of beacons indicate a line parallel to the other, between which a vessel drawing less than 26½ feet may run in freely. To distinguish those beacons from others which are set up as required for the guidance of the dredgers, the line of direction has been lengthened by the addition of two strips of iron, whitewashed, which hang on the bank at the inner part of the outer port. These marks may be seen from a great distance at sea, especially during the afternoon when the sun shines on them.

Mooring Buoys.—Two mooring buoys are placed outside the port for the use of the Messageries steamers; the port has no roadstead. A depth of 50 fathoms is found at two or three cables from the shore; therefore, to meet that deficiency in accommodation, a mooring buoy has been secured to an old dredger filled with shingle and sunk in 50 fathoms at one mile S. W. from Pointe des Galets. The strength of this mooring must not be trusted; but a ship, while holding to it, should be ready to get under way at a moment's notice.

A transporting buoy is moored in the N. E. part of the outer harbour to assist vessels in swinging eight points prior to entering the inner basin.

Inner Port.—Upon the west bank of the inner harbour stands the coal depôt of the Messageries Maritimes; at the north end there is a wooden wharf built on piles 213 feet long by 29½ feet wide. At this wharf vessels generally discharge and receive cargo. While lashed to the jetty they generally use their starboard anchor as an off-fast. The north basin is reserved for dredgers and barges belonging to the harbour works. The south basin, intended for vessels of larger size, is 23½ feet deep, and has three jetties in which ships can lie, each communicating with a store-house, which, in consequence of the elevation of the ground, possesses the advantage of having its ground floor on a level with the wharf, while the stage below corresponds with the level of the tramway, which is connected with the railway.

The landing place is at the inner part of the south basin. There is a Custom House, Post and Telegraph offices at this place.

Pilots will go out to meet approaching ships on the usual signal being hoisted, and board them at three or four cables outside the entrance. All the movements in the port, also the control of the pilots and police; are under the lieutenant of the port.

Directions.—On approaching from seaward the principal landmarks will be the Peak Cimedef and the light or light-house on Pointe des Galets. The entrance to the port should be brought to bear about E. S. E. and so maintained, the set of the current being observed and the effect neutralized by change of course. It is strongly recommended to bring those marks in a line which indicate the weather side (in respect of current) when at a considerable distance, so as to insure time to preserve it steadily with a small helm before entering between the piers. Neglect in that particular and the endeavour to make a short turn will cause the risk of grazing the jetties or even grounding.

The ship should enter with her line of keel parallel with the course up the channel and a speed of three or four knots. The great height of the banks make them appear nearer than they are, and those who enter for the first time are fearful of having too much way on the ship; but the space from the pier heads to the inner part of the outer port is over 500 yards, the banks being steep. The engines should be stopped immediately the ship's head is within the piers. With a long ship and strong current the stern may be swept to leeward while the bow is in still water. That result must be anticipated by keeping the stern up on the side from whence the current runs, and by using the helm quickly and freely in order to preserve the direction of the channel and to avoid going near the lee pier head.

A boat belonging to the port will meet the ship in the middle of the channel with a hawser from the transporting buoy to be taken in on the port bow. It is advisable to have a ship's boat ready to assist with the hawsers, which are not always worked as quickly as may be desired. The ship's way must be stopped in time; but there is no objection to her bow going to about twenty yards from the inner end of the port: it would make the evolution of turning towards the passage easier. With the rope from the buoy to the port bow, the helm hard a-starboard, and the engine turning slowly ahead, also, if necessary, a rope from the starboard quarter to one of the guns on the bank, the ship will turn eight points to port and point directly through the passage to the inner basin. On leaving, the best way to insure keeping in the centre of the channel is to look astern and keep between the lines indicated by the beacons as well as directing the ship's head. When the bow clears the pier heads, the current will carry it to the right or left unless the helm be applied quickly.

Quarantine.—Ships having a clean bill of health and being in good sanitary condition may, after communicating with the pilot, enter the port and make fast; but they must fly the yellow flag and avoid all communication till admitted to pratique, which can only be granted by the medical officer who lives at St. Paul.

Barges.—The port possesses four large barges said to be capable of carrying 150 tons each; they are too unmanageable to be of service outside the port. Generally the loading and unloading of cargo is carried on alongside the jetties.

Fresh Water.—There is now (1890) a well near the inner part of the north basin, which supplies water of inferior quality: it is not fit for drinking in any form.

It is in contemplation to lead an abundance of excellent water from the river Galets.

Wind.—The trade wind is first felt at St. Philippe at the S. E. point of the island. On meeting the high mountain mass the aërial current is divided, one branch passing along what is called the weather coast as far as St. Denis, where Cape Bernard deflects it to the N. W., the other passing along what is called the lee side and is turned off to seaward by Cape Noir. The result is that the part of the coast comprised between Cape Hussaye and Cape Bernard, including St. Paul and Pointe des Galets, only experience light eddy breezes during the season of the trade wind. Consequently all that coast is well sheltered during the summer.

Cyclones.—The cyclones during the winter season (November to March) generally strike Réunion from the east in the vicinity of St. Rose, their rotation in the southern hemisphere being direct as the hands of a watch. The coast about Pointe des Galets receives the shock under the least unfavourable circumstances, inasmuch as if it be in the dangerous side of the semi-circle, the wind can only reach Galets after passing the natural screen formed by the high mountains in the interior. It is therefore certain that during the whole year the coast between Pointe des Galets and St. Paul is the most sheltered part of the island.

Local Currents.—The result of observations made during several consecutive months in 1888 shows that the currents in the vicinity of the entrance to Pointe des Galets are variable both in force and direction. During that period the rate never exceeded seven-tenths of a knot an hour, while the direction was always at right angles to the entrance channel; that is, running along the coast either to the north or south, but more frequently the former. Therefore a large vessel should never enter at less speed than three knots.

Rollers.—The local effect of this phenomenon is sometimes to stop entirely both the entrance and exit of all vessels; also to displace a quantity of sand and shingle, necessitating the labour of removing it from the channel by dredging. The rollers also cause considerable inconvenience in the inner basin by the swell which is driven in, sometimes so violently that special lashings and moorings are rendered indispensable.

During the summer (May to October), the season of the S. E. trade wind at Réunion, places about that latitude in the Indian Ocean are often visited by hurricanes. (According to Meldrum and Bridet that period is the most free from hurricanes.) Those storms manifest their presence at a very great distance by the propagation of a swell of more or less magnitude, which, on encountering a steep isolated shore such as Réunion, where the undulation is suddenly arrested, causes a succession of violent shocks called by the French "ras-de-marées" and by English seamen "rollers." No indication or forewarning whatever is given of their approach, as they begin and end without any apparent cause.

At Pointe des Galets the rollers rarely continue more than one day, and though they occur at all seasons, they are less frequent during the winter (November to March). The greatest number have been experienced in August, and during that month they may continue two or even three days.

During the smaller rollers, or even those of mean importance, the wave spreads itself along the sides of the entrance channel, leaving sufficient space in the centre for the entrance, and still better for the departure of vessels; but when the waves assume great proportions, the undulations spread across the whole space between the piers and rise 6 to 10 feet above the ordinary level. At such a time the entry is impossible, not only for large ships with deep draught, which would most certainly strike the ground, but even for vessels of ordinary size, which would become unmanageable in the violent eddies caused by the off-set.

After the swell which forms the roller has entered the outer port it diminishes gradually towards the end, where it produces a great surf. The waves deflected by the bank enter the passage to the inner dock and two basins, where they are expended, producing a swell and surf of various degrees. To vessels lashed to the jetties a movement is caused which at times becomes very injurious, if not absolutely dangerous.

N.B.—In the notice issued to Mariners (1896) Pointe des Galets Harbour is reported to be dangerous on account of an unchartered shoal carrying 11 feet, lying 48 feet from the Morne Point.

CHAPTER VI.

SPECIAL REMARKS ON WINDS AND PASSAGES FROM MAURITIUS TOWARDS INDIA.

HYDROGRAPHICAL NOTICE, &c.

THIS is a progressive age we live in. New inventions and ideas cropping up daily, especially in the maritime world, necessitate the sailor's routine of life to change with the times. Ships have altered in size, speed and equipment considerably from what they were 25 years ago. Rules for trimming one of the old square boxes that formerly plied in these waters could hardly be adapted to the huge four-masters of to-day. Everything is so staunch about these large modern vessels, that in beating down the Bay of Bengal or Arabian Sea during a strong S. W. monsoon, the only thing that is likely to cause trouble are the sails, as these are apt to split or blow away. Sea and wind are not factors so much reckoned on nowadays as in those of the old wooden ships. I have known the latter class of vessels to be beating down the Bay under reefed top-sails, when a four-master would be beating down with royals set and apparently making fine weather, so that the Bay of Bengal is not considered such a bugbear by this class of ships during the S. W. monsoon as in the former class.

S. W. Monsoon and the S. E. Trade Winds.

Since Mauritius and Seychelles have been connected by cable with the rest of the world a new problem has arisen which is still unsolved—it is the influence of the S. E. trade winds on the S. W. monsoon in India. In former years the probable strength of the S. W. monsoon was prejudged to the amount of snowfall on the Himalaya mountains, but now it is supposed that the monsoon is influenced by the strength of the S. E. trade winds. In the early part of 1897 a correspondent of the *Times of India* drew the attention of the public to this. It was due to this correspondent that I turned my attention to study the monsoon for the above year and compare it with those of the past four years in the Arabian Sea. As I am now the only regular trader under sail plying between Mauritius and Bombay, I am of the writer's opinion that the S. E. trade does influence the monsoon in certain parts of the S. W. monsoon region, if not the whole, as will be noticed by the weather on the east and west sides of the Arabian Sea. In June 1897, the weather was so bad on the Arabian Coast that the P. & O. steamer "Aden" was lost on Socotra Island, and the Bombay steamer "Sultan" foundered in the same locality whilst fine weather prevailed on the east side.

It is the belief that if the S. E. trade winds are strong in May, June, and July, when they are near the Equator, a like S. W. monsoon may be expected. Before the breaking of the monsoon Simla and Bombay receive telegrams from Mauritius and Seychelles daily, giving full details of wind and weather; after the monsoon breaks this is discontinued. Mauritius is situated at almost near the southern limit of the trade winds and Seychelles the northern limit. These telegrams only convey to India what is passing in their immediate vicinity.

Between the two islands there is a distance of nearly 1,000 miles, and little is known beyond occasional abstracts from sailing ships' logs.

In 1896, the memorable year of the Bombay Plague, the monsoon was exceptionally strong, with a very great rainfall for the month of July, and the sea rolling into the harbour beyond the usual. A sailing ship beating out was detained over a fortnight, having had to put back three times between the light-ship and the Apollo Bunder. The same ship made the passage up from Mauritius in June in eighteen days. She carried very strong trade winds to within 3½° S. of the Equator, and little or no light winds until picking up the S. W. monsoon. In the following year the S. E. trade winds were very light at Mauritius until the 2nd of July. It increased on the early morning of the 3rd, the day of my departure for Bombay, so that I had a very favourable opportunity of comparing this year with the last and previous years. We carried strong S. S. E. winds and high sea up to 10° S., when it fell light with smooth sea, and continued so until 3½° S. it veered to S., and as we advanced N. it worked into S. W. We carried a very light monsoon and fine weather without any rain into Bombay harbour—passage 27 days. The royals were never clewed up from 10° S. until we shortened sails for the pilot. In a conversation about the mildness of the monsoon, I was referred to a letter in the *Times of India* of the 19th May, entitled "Forecast of the Coming Monsoon," and is reproduced here in parts.

Normal Monsoon probable.—Simla, 18th May 1897.

Mr. Eliot has issued a tentative forecast of the expected monsoon. His conclusions are as follows:—The data extracted from the logs of ships entering the ports of Calcutta and Bombay are too scanty to be of any value; but they are, on the whole, in favour of the S. E. trades of at least the normal strength preceding. The information appears to indicate that conditions will continue somewhat abnormal in the S. E. regions, and that South Africa, parts of Australia and Mauritius, as well as India, have suffered during the past year more or less severely from the scanty rainfall and drought. These conditions are, however, so far as can be judged from the information received, passed away, and it is probable that the S. E. trade winds are now little, if at all, below the normal strength. An examination of the rainfall variations at Zanzibar and Mauritius, in comparison with the corresponding variations of India, indicates that the approaching monsoon rainfall will, as a whole, probably be in slight to moderate excess. A comparison of the meteorology of India during the present year and the past 20 years indicates that there is only one year (1890) with which the present (up to 15th May) bears considerable resemblance. The rains of the year 1890 were favourable over the whole of India, with the exception of a part of Upper India. This comparison, hence, slightly increases the probability of a normal monsoon. The information given above indicates that it is very probable that the S. W. monsoon will not be much below normal strength, and it is probable it will be normal or slightly stronger than usual. Hence it is most probable that it will be of normal strength. The conditions are at present favourable in North-Eastern and Central India and in a great part of the Peninsular, and those areas will hence, on the supposition of a monsoon of normal strength, receive at least normal rain. . . . . May is, it should be remembered, a month of large and rapid meteorological changes in India, due to the intensity of thermal actions, and hence it is possible, although not probable, that the actions of the next fortnight or three weeks may considerably modify the

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The crop at Mauritius for 1897 is 40 per cent. less than in 1896, due to drought.

local conditions in India, and hence affect considerably the estimate of the probable character of the distribution of the rainfall in India during the next four months.

It will be gleaned from the above, that nothing is positively known of a coming monsoon. The question of the S. E. trade as a factor in producing the normal or abnormal conditions of the S. W. monsoon appears to be in its infancy and has to be carefully studied. To assist telegraphic reports from Mauritius and Seychelles, sailing ships masters and officers must lend a helping hand by carefully noting meteorological changes and entering them in their log books correctly. If masters and officers would take an interest in this direction, and if ever it becomes an admitted fact that the S. E. trade does influence the S. W. monsoon, it would be so much to their peace of mind when bound north; they could form a fair estimate of the monsoon they are likely to meet according to the condition of the trade winds. This, my first year's studies, shews that with a light S. E. trade from 10° S. to near the Equator, the S. W. monsoon was exceptionally light up the middle and east side of the Arabian Sea. The weather on the west side was such as to wreck two valuable steamers with serious loss of life.

It will be of some interest to cite here Dr. Meldrum's admirable discussion of the winds and weather in the Indian Ocean as far back as March 1853. He remarks as follows:—

Is not the S. W. monsoon of the northern hemisphere, from April to October, a continuation of the S. E. trade winds? If the N. W. monsoon is not caused by a deflection and prolongation of the N. E. trade, and the S. W. monsoon by a similar deflection and prolongation of the S. E. trade, whence comes the air that feeds them? When the N. W. monsoon of the southern hemisphere prevails, the N. E. trade is found blowing to the vicinity of the Equator, and a little beyond it are the northern limits of the monsoon. Whence, then, is the air which sustains the monsoon derived, unless from the N. E. trade which prevails in its immediate vicinity, and has, like itself, a southerly course? Similarly, when the S. W. monsoon prevails in the northern hemisphere, the S. E. trade blows down to the Equator, or beyond it, and the southern limits of the monsoon are in the immediate neighbourhood of the northern limits of the trade, both winds moving in a northerly direction. The S. W. monsoon sets in at Ceylon, and on the southern shores of India in the early part of April, and it gradually advances to the northward, reaching Bombay about the 15th May, and places further to the north at later dates, it being caused by the rarefaction which takes place over the extensive plains and deserts of Asia as the sun's meridian altitude increases.

Now, whence does this great rush of air proceed, unless from the S. E. trade? The trade blows in greater force in the winter of the southern hemisphere in consequence of the elevated temperature which prevails to the north of the Equator; and after passing over into the northern hemisphere, it is deflected to the N. E. and blows like the S. W. monsoon near Sumatra towards the locality of maximum heat.

As the monsoon progresses to the northward, the N. E. trade recedes before it, or rather the trade, in reaching the line of maximum temperature, is rarefied and ascends. Thus between the two opposite winds there is a zone of calms and variables, analogous to that between the S. E. trade and N. W. monsoon in the southern hemisphere; and theory would lead us to infer that this zone also is the scene of storms and hurricanes, which in the Bay of Bengal and in the China seas revolve in a direction contrary to that of the hurricanes of the southern hemisphere, and have a progressive motion from E. S. E. to W. N. W.; for the heated land of Asia lying to the west of those seas, the belt of calms and variables in them would extend towards the land in the direction indicated; and the monsoon being stronger than the trade and impinging on the S. E. quadrant of the storm, the latter would be impelled towards the W. N. W. whither the elevated temperature in that direction would also have a tendency to draw it. In short, the great agent in the production both of the ordinary winds and of their stormy gyration seems to be heat.

Passages, Mauritius to Bombay.

Leaving Mauritius on or about the 10th December for any of the ports marginally noted to arrive during the N. E. monsoon if the weather is not cyclonic, light to variable winds from almost any point of the compass may be met with up to the Equator. If carried to the eastward, cross the Saya de Malha Bank anywhere in the middle and try to cross the Equator in 68° or 70° Long. E. It may be extremely difficult to get any nearer east to the Maldives, and even to lay any higher than north-west. However, stand away on the starboard back to the westward as the wind will allow. The current that sets to the south-westward, and what is known as the Mozambique current, so named because it sets into that channel, may or may not be met with. If this current is encountered, it may exceed 80 miles per day until it is crossed. If the ship can weather Socotra by a 100 miles or even less, stand in as soon as the Gulf of Aden is opened, and even before; the wind will gradually veer through south until it gets to the westward as the vessel advances north. It is not advisable to lay across the Arabian Sea with that westerly wind until in 19° 30′ or 20° N.; for, on approaching the Coast of India, N. E. monsoon and southerly currents are almost sure to be met. Some advocate bounding up at this season to pass west of the Seychelles and run up with the westerly winds. I do not advocate this. I have noticed that chartered vessels taking extreme west and east tracks make a longer passage than I do. Taking this westerly route, the conditions may be such as to cause a vessel not to weather Socotra, and be even drifted away by the current considerably S. and W. of it. The passage by the track frequented by me in the N. E. monsoon is from 45 to 50 days for a vessel of medium sailing qualities. No master need trouble himself about a dead beat up at this season. The following is from the log of the "Sir Lancelot" under my command:—"Sailed from Port Louis 31st December; 15th January crossed the Equator in 60° E. 1st February, Socotra bore W. S. W. 200 miles; wind E. N. E.; on the 2nd, Ras Madraka bore N. E. 150 miles. From this point the wind gradually hauled to S. until it got to W. and N. W. Arrived at Bombay 9th February—40 days' passage."

Off Socotra in January and February.

On another occasion, January 12th, I sighted land off Maseera Island and was becalmed about 40 miles off the coast for three days. This retarded the passage, but I arrived in 45 days. If bound to Kurrachee, continue and make that port according to sailing directions.

Calms in the Arabian Sea.

Working up the Arabian Sea during the N. E. monsoon, it is at times vexatious to notice the fine weather and long spell of calms that sometimes prevail over the whole sea. One year a good commanding breeze may be had; the next, in the same position and same month, light winds and calms may be the result. It is useless for a navigator to worry his mind and conjecture all sorts of things; that if he were in the middle or on the east or west side he would have had wind. The conditions may be general, spreading from Arabia to India. I have known it to be the case when I made a 68-day's passage on one occasion about the same time above mentioned. It will be remembered that in 1878 the Clyde ship "Gareloch" sailed from Bombay about September for Calcutta, when she became over-due. She was posted at Lloyd's as missing; in the latter part of December she was reported by a steamer off Ceylon. This is the longest spell of calms and variables remembered in this sea.

Malabar Coast.

Winds and Weather on the Malabar Coast.—The N. E. monsoon or the fine season begins early in November along the southern parts of the coast and continues till about the end of April. The S. W. monsoon or rainy season commences in May and continues until September, but October is considered a very uncertain month.

December, January, February.

In these three months sea and land breezes prevail and are regular, with smooth sea and cloudless sky. To the south of Calicut the land breeze sometimes blows for 24 hours without any sea breeze through a gap in the Ghauts. As February draws to a close the land winds become regular. The sea breeze usually dies out about sunset, when a calm ensues, seconded by a land wind which may be expected between 9 P.M. and midnight, and may continue until 9 or 11 o'clock next morning, when it will decrease in force until a calm ensues about noon. To be benefited by the land breeze, a vessel should be prudently navigated close to the shore during the night, and in the morning keep off the land in time so as to make good use of the sea breeze during the afternoon. Attention must be paid to the lead, coast not being advisable to be approached under 15 fathoms at night.

March and April.

The sea breeze is usually strong, generally from W. to N. W., weather cloudy and hazy over the land at evenings, with occasional light showers of rain. Land winds in these months are faint.

May.

Prevailing winds from W. to N. W. uncertain and variable with light showers of rain. Vessels bound north should keep clear of the land and be prepared for sudden change of weather, as gales are liable to occur from S. W. during this month, while heavy squalls may be expected off the land about midnight from the gaps in the Ghauts. The weather will be found clear and fine with a N. W. wind, but cloudy and hazy with a S. W. wind.

June and July.

The S. W. monsoon usually sets in early in June along the southern part of the coast, or late in May, generally preceding its advent off Bombay by a fortnight. Very often it is ushered in with a gale from S. E. to S. W. and a heavy sea and abundance of rain. In these months the wind generally hangs between S. W. and W. by S with heavy squalls, rain and sea; sky cloudy, making it difficult to obtain observations.

August and September.

The monsoon begins to moderate in August, and squalls are less frequent. In September the weather is fairly moderate. In these months the winds generally blow from W. to W. N. W. with cloudy weather and heavy rains at intervals.

October and November.

In these months the weather is generally unsettled with variable winds until late in November. The passage up the coast is tedious owing to light winds and adverse currents, while the passage down the coast may be accomplished with comparative ease.

BOMBAY.

Bombay, in Lat. 18° 54′ N., Long. 72° 49′ E., is the principal sea-port of Western India, and is the terminus of the mail steamers.

The City of Bombay consists generally of well-built houses and broad streets. The most conspicuous public buildings stand on the Esplanade facing Back Bay, and consist of the Record Office, Secretariat, University, Senate Hall, High Court, Public Works Secretariat, and Post and Telegraph Offices. The Sailors' Home adjoins the Government Dockyard. The most conspicuous buildings in the densely built tract known as the Fort are the Town Hall, Mint, Cathedral, Port Trust Offices, and the European General Hospital; while immediately to the north are the Victoria Railway Station and the Municipal buildings, the tower of the latter being 250 feet high.

To give those who have never visited this "City of Palaces" an idea of it, I cannot do better than use the words of Hajee Browne in the *Magnet* of 26th August 1896, entitled:—

"BOMBAY REVISITED."

Sixteen years!

How short and yet how long a time! How changed and how unchanged! How strange and new, and yet how old and familiar!

These were the refrains I mentally repeated from time to time as I drove from the new Ballard Pier on landing in Bombay after sixteen years of absence. What a difference the pier itself indicated; nay the whole "Foreshore," as I scanned it from the deck of the Ganges, was a novelty,—a panorama in which I could detect no trace whatever of the shelving unformed banks from which 21 years ago I embarked on my way to make the pilgrimage to Mecca. The old familiar contour of the town itself is gone, the stately buildings that have turned the maidan of my day into a field of palaces, rearing their lofty heads disdainfully above the modest heights to which their predecessors were content to aspire, making the old town seem as strange and unfamiliar as one I had never seen before. Looking at the town I felt myself a veritable Rip Van Winkle, but turning to the mainland, I could almost fancy that I recognised the trees upon its verdant shore. So Elephanta and other ancient landmarks up the harbour brought back a flood of recollections, but the scant, naked poles of the steamers were in striking contrast to the forest of masts and yards of the stately sailing ships of former days.

And once on shore, the pier and everything inanimate upon it was a novelty. But the people! Every one I see looks like an old acquaintance. Don't tell me that that spruce young Parsi is but sixteen years of age! I knew him twenty years ago. Knew him? Why, I feel as if I knew everyone of the bustling crowd, the very cock of their puggrees, the very folds of their flowing garments. I have only to look at them to feel assured that I am once more in old familiar Bombay.

Sixteen years!

Wondrous almost are the changes in the aspect of the town; but the people, they are the same and yet changed! Fresh from Cairo with its whitewash civilisation, its people, whose great ambition seems to be to bury their recollections of the past, it is refreshing to come here among folk who boldly stamp themselves as what they are. The Cairone is as the goods "Made in Germany" or elsewhere, needing a label to tell their origin; but the Bombay-walla, be he Muslim, Hindoo, Parsi, what not, needs no ticketing—he is the real "Home made" article; and to those who think but little of him, I would only say, "Go and live amongst other Eastern races and peoples for a year or two, and when you come back, if you don't award him the prize for good qualities, you are but a poor or a sadly prejudiced judge."

But unchanged, and perhaps unchangeable, as they are, there is a change in the people. In the few days that I have been here I have seen ample proof that, with all their conservatism, time and circumstances are slowly but surely working their own will in them. I have, indeed, noticed nothing but trivial incidents, yet, such as they are, they are true weather-vanes of the social and political winds that are blowing men of rival races and creeds eating and drinking at the same table, using the same cups and plates. Wherever I have gone, in this and other things I have seen the faint outlines of a long funeral procession, and I have heard the first, though as yet faint and far-off, tollings of the knell that is slowly ringing into the limbo of the past and-to-be-forgotten old days of caste, race, and religious hatreds. The movement has begun spontaneously—the outcome of railways, education, and other influences; but, like that of the first trickling drops that creeps over the bank of a flooding river, it is a motion that, once begun, must go on ever increasing in force and volume until it triumphantly sweeps all obstacles from before it. Yet another change I notice, and this, too, a happy one. Everywhere I find evidences of the increasing prosperity of the people, a higher standard of living, a freer indulgence in luxuries. Streets that in my time were filled with petty hucksters' shops are now attractive with the display of enterprising merchants of goodly stocks of superior goods. Twenty years ago I knew a Memon youth hawking about a basket of sundry small wares for ladies, rejoicing in a good bargain over half a dozen spools of thread. Yesterday he showed me over his store-room containing cut-glass furniture valued at thousands of rupees, a speciality he has introduced for the benefit of rajahs, and forming a most unique and interesting display. This is, I believe, but a fair sample of the chief gainers by the tide of prosperity.

Sixteen years!

New men and new manners have largely taken the place of the past and gone; but, after all, the changes are but on the surface. Among all classes, castes and creeds I have found old friends whose friendship remains unchanged by the lapse of time, and in the warm greetings I have received I find a fresh proof that, in Bombay of all other places in the world, he who will may easily gain the lasting friendship of the people. It is a lesson I would fain see my own countrymen learn.

BOMBAY HARBOUR AND SAILING DIRECTIONS.

The remarks relating to Bombay Harbour are from the Survey in 1892-93, *by Lieutenant Smith, R.N., under the direction of Commander Oldham, R. N.*

Bombay Harbour.

Bombay Harbour is about 15 miles long N. N. E. and S. S. W. and 4 to 6 miles wide, with general depths of 4 to 6 fathoms, the bottom generally consisting of mud. The harbour contains several islands, rocks and shoals, and its shores are indented by numerous bays and inlets.

Port Limits.

The south port limit extends from Khandari Island to the mainland abreast; west port limit from Khandari Island to the outer light-vessel and thence to Malabar Point; north port limit from Hog Island to Trombay village and from the south-west point of Trombay Island to Sewri fort; the east port limit from Nocar Point across the entrance for Pen river to the south extreme of Karanja Island.

Outer Light-vessel.

The outer light-vessel is moored in 6½ fathoms at 7 miles N. by W. ½ W. from Khandari Island, and 3½ miles S. by W. ½ W. from Prongs Light-house, exhibits, at an elevation of 36 feet, a revolving red light, which attains its greatest brilliancy every 20 seconds, and should be seen in clear weather from a distance of 10 miles. The vessel is painted red, has three masts, carries a red ball at the main, and hoists a red flag in the day time when a vessel is in sight. At night she burns a blue light every half hour from 1st June to 30th September, and every hour from 1st October to 31st May, and displays a torch-light at the half hour.

From the light-vessel Sunk Rock Light-house bears N. 35° E., distance 5 miles, the shoalest part of Thal shoal E. by S. ½ S., distant 2¼ miles, and the southern extreme of the foul ground off the S. W. Prong N. ¾ E.; distant 2½ miles.

The flood stream near the outer light-vessel runs to the E. N. E. and the ebb to S. W., the latter making about noon, at full and change, when the average rise and fall at springs is about 15 feet and at neaps 9 feet.

Eastern Shore.

At three-quarters of a mile within the south entrance point of the harbour there is a hill 180 feet high named Thal Knob, having on it a white beacon 60 feet high; about half-a-mile south of this hill there is a similar hill of rather less elevation named False Knob.

In thick weather these hills stand out well among the cocoanut trees, being detached from the more distant high land.

At 3½ miles south-east of Thal Knob lies Ashuevra Hill, 922 feet high, having on it two hummocks named the Paps, on the northern of which stands a black beacon 80 feet high.

Fishing Stakes.

An extensive group of fishing stakes lie north and east of Thal shoal in 32 feet at low water springs. This group is removed during the S. W. monsoon; but care is necessary to keep clear of its position, which is about half way between that shoal and South Karanja shoal buoy, as frequently the stakes are broken short off and cannot be seen above water. The line of bearing of this group is about N. W. and S. E.

Kansa (Gull) Islet.

Kansa (Gull) Islet is 20 feet high, lies at the entrance of Pen river at 2¼ miles N. by E. 3¼ E. from Thal Knob beacon, and W. by N. ¼ N. 2½ miles from Nocar Point, the south entrance point of Pen river. About one cable S. W. of this islet there is a knoll with 6 feet of water on which the sea breaks, and at a quarter of a mile south of the islet lies a detached rock, dry at low water.

Great Karanja.

Great Karanja is a long flat-topped hill, 991 feet high, situated on the south end of Karanja Island, and bearing N. E. ¼ N. from Thal Knob beacon; the south side of this hill is steep and almost inaccessible, but the northern part slopes gradually from its summit to a peak 720 feet high, having on it a ruin.

Little Karanja Hill.

Little Karanja Hill, a very sharp summit, 696 feet high, is on the north end of Karanja Island, and is formed by four ridges meeting in the centre.

Karanja Reefs.

Karanja reefs extend nearly 2 miles from the west side of Karanja Island and about 4 miles north and south. The parts of this reef, which are dry at low water, extend but a short distance from the shore, and are composed of trap rock covered with loose boulders and intersected with fishing ponds. On the north-west extreme of Karanja reefs in 6 feet of water, stands a red beacon 40 feet above low water springs.

A red buoy surmounted by a globe, is moored in 5½ fathoms near the west, and a red buoy with triangle in 7 fathoms near the north-west extreme of these reefs.

Uran Shoal.

Uran shoal, with 2 feet of water on it, lies about 1½ miles N. E. ½ E. from Karanja beacon, and is marked by a circular stone beacon 34 feet high, painted red.

Western Shore.

Western Shore, Colaba, the north entrance point of Bombay Harbour, is a long, low, rocky point, surrounded by fringing reefs, which dry at low water for a considerable distance seaward. The southern extremity of these reefs, named the Prongs, lies 1½ mile from the shore.

Colaba, formerly separate, is now part of Bombay Island, being joined to it by a substantial causeway, the space on the north side of which (between the two large blocks of houses on Arthur Bunder called Grants Buildings and the Cooperage at the south end of the Esplanade) is filled in by natural and artificial agencies.

That part of Colaba in the vicinity of the old light-house is termed Upper Colaba, the other part Lower Colaba. A continuous line of houses, barracks and factories connects the light-house point with the Fort of Bombay. The northern extremity of Colaba is formed by Grants Buildings, two large blocks of warehouses on Arthur Bunder, the head of which forms the north-east point of Colaba, Jamsetji Bunder being situated two cables S. W. of it, nearly abreast the Dolphin Light, and the Sassoon Dock three cables further to the S. W.

The principal channel leading into the harbour lies between Prongs reef and Thal shoal, and is about 2½ miles wide.

North Pap and Thal Knob beacons, bearing S. E. by E. ½ E., leads clear of all foul ground south of Prongs reef.

Light.

On Prongs reef stands a light-house 146 feet high, from which, at an elevation of 136 feet above high water, is exhibited a flashing white light, showing a flash every ten seconds, visible in clear weather from a distance of 18 miles. The light-house is painted with white, red, white and black horizontal bands, and is connected by telegraph with Bombay.

Colaba Shoals.

The Colaba shoals extend from the Prongs reef along the east side of Colaba for about 3 miles, and project in some parts nearly a mile from the shore. On the outer edge of these shoals, abreast the southern extremity of Colaba, lies an 8-feet knoll with depths of 11 to 13 feet close around.

Sunk Rock.

At half-a-mile east of the 8-feet knoll there is a shoal four cables long, N. N. E. and S. S. W., and one cable across its broadest part with 5 to 18 feet water, and deeper water close around. On the northern portion of this shoal lies Sunk Rock, which is awash at low water, and between which and the outer edge of Colaba shoals there is a channel nearly two cables wide, with 19 to 27 feet water in the middle.

Light.

Sunk Rock Light-house, built on the rock, is a black circular tower 95 feet high, from which, at an elevation of 64 feet above high water, is exhibited a red and white light occulting every five seconds, visible in clear weather from a distance of 14 miles.

The eclipses are from one to two seconds: white between S. 7° W. and S. 30° W.; red from S. 30° W. through W. to N. 15° E.; white from N. 15° E. to N. 31° E.; and red from N. 31° E. to N. 69° E.

Oyster Rock.

Oyster Rock is situated three-quarters of a mile N. N. W. from Sunk Rock and half-a-mile from the shore. It is flat, about 70 feet high, about a cable long by half a cable broad, and has a battery upon it. A rock named Nigger's Head, with one foot water on it, lies at two cables S. W. of Oyster Rock. The shoal on which these rocks stand has on it depths of 2 to 6 feet and 7 to 14 feet close around. The channel between these rocks and the Colaba shoals has from 8 to 10 feet water in it.

Fishing Stakes.

The fishing stakes extend S. E. by S. from the north end of Oyster Rock for nearly half-a-mile in 17 to 27 feet. There are intervals between these stakes large enough to allow small vessels to pass through; but care must be exercised in doing so, as the stakes are frequently broken off short just below water.

Colaba Reef.

Colaba reef is situated a cable off shore abreast the Victoria Bunder, and four cables north of Oyster Rock, is nearly four cables long N. E. by N. and S. W. by S., with rocks drying from one to 3 feet for about half its length. Near its north and south extremes, in one and 6 feet, respectively, stand circular stone beacons, painted in black and red bands.

Dolphin.

Dolphin, a small rocky shoal, which partly uncovers at low water with 9 to 15 feet close around, and 4 fathoms half a cable east of it, lies N. ½ E. 1½ miles from the Sunk Rock Light-house, and two cables east of the north Colaba reef beacon.

Light.

On Dolphin Rock stands a great tower 35 feet high, from which, at an elevation of 20 feet above the sea, is exhibited a fixed white and green light, visible in clear weather from a distance of 3 miles. The light shows green from N. to W., white from W. to S. W. by W., and green from S. W. by W. to S. E. by S.

Middle Ground Shoal.

Middle Ground Shoal, situated N. N. E. ¼ E., about 2 miles from Sunk Rock, is two cables long N. and S. and one and a-quarter cables across the broadest part, having near the centre a rocky islet about 40 feet high, on which stands a battery. On the shoal surrounding this islet there are depths of 10 to 18 feet with 3½ to 6 fathoms close around.

A buoy, painted with black and white horizontal stripes and surmounted by a triangle, is moored in 3¾ fathoms water near the north extreme of the shoal.

The University Clock Tower, in line with the Scotch Church, N. W. ¼ W., leads southward, and the Clock Tower, bearing W. by N. ¾ N., leads northward of Middle Ground Shoal.

Wellington Patch or Tilly Rock.

Wellington Patch or Tilly Rock, with 8 feet water and 10 to 14 feet close around, lies one and a half cables east of the Saluting Battery. This is the northern portion of a series of patches, with 5 to 8 feet water connecting with the Colaba reef.

Apollo Spit or Falkland Rock.

Apollo Spit or Falkland Rock, with 11 feet water and 13 to 16 feet close around, lies N. W. by W. about half-a-mile from Middle Ground Shoal at two cables E. S. E. of the Dockyard flagstaff.

Flagstaff Shoal.

Flagstaff Shoal, with 8 feet least water and 18 to 24 feet close around, lies N. by W. ½ W., about six cables from middle ground shoal and four cables from the shore; a black buoy with a flag is moored on its south-cast end.

North Patch.

North Patch, with 11 feet water and 13 feet close around, lies N. by W. ¼ W., one mile from Middle Ground and two cables from south Bori Bunder, and a 7-feet rock lies S. E. by E.

Three-quarters of a cable from the North Patch a black buoy, with globe, is moored in 23 feet water at three cables E. ½ N. of this patch.

Cross Island Reef.

Cross Island Reef, with 2 feet least water and 12 to 14 feet close around, is about one cable long north and south, and a quarter of a cable across its broadest part. A black buoy with a triangle is moored in 24 feet water about one and a-half cables east of this reef. Just inside the line joining this buoy and the North Patch buoy the bottom is very foul, there being several rocky patches of from 7 to 12 feet water.

Nearly two cables S. W. of Cross Island reef lies a shoal with 2 feet water, on which stands the South Channel beacon, 36 feet high, and painted in red and black bands. There are depths of 13 feet around this shoal, and also in the channel between it and Cross Island Reef.

Cross (Gibbet) Island.

Cross (Gibbet) Island, 64 feet high, situated N. ½ E., 1¾ miles from Middle Ground and three cables from the shore, stands on the east side of a reef of rocks and has on it a battery. Shoals extend from this island four cables in a south-westerly and two and a-half cables in a northerly direction. The southern shoal has depths of one to 4 feet, and on its north-west edge in 5 feet water stands a tripedal beacon with staff and diamond, and between this shoal and the shore there is a narrow passage with 9 to 12 feet water. The north shoal has 3 to 6 feet water, and on its north extreme stands North Channel beacon 28 feet high and painted in black and red bands. The reef dries for a distance of one and a-half cables north and west of the island.

Lights.

On the North Channel beacon a red and a green light, placed vertically 2 feet apart, are exhibited when the dock gates are open.

Bhandarwada Hill.

Bhandarwada Hill, on which stands Belvedere House and the Grant Reservoir, is situated in Mazagon, immediately behind the P. & O. Dockyard. It is 161 feet high, and is easily recognized on account of its isolation and its being surmounted by a few palms of unusual height. These palms are the highest points on the eastern side of Bombay Island with the exception of the Municipal Tower.

Fishing Stakes.

There are three groups of fishing stakes between Cross Island and Mazagon: the west group lies in 7 feet water, about half-a-mile E. by N. from Mazagon Pier; the middle group in 17 to 23 feet water, three-quarters of a mile E. by S.; from the pier; and the east group in 17 to 19 feet water, about one mile E. by N. from Cross Island.

Tucker Patch.

Tucker Patch, at two miles S. W. ½ W. from Butcher Island and 1¾ miles N. E. by E. from Middle Ground, is marked by a beacon 42 feet high and painted in black and red bands. Another patch, distant two and a-quarter cables, N. by W. ½ W. from this beacon, is formed of rubble stone, the highest point of which dries 7 feet, and is marked by an iron frame work carrying a triangle, the apex of which is 18 feet above high water. There is a shoal with 10 feet water situated one cable east of this beacon,

Butcher Island.

Butcher Island, 68 feet high, situated 3 miles E. by N. ½ N. from Cross Island, is four cables long and two and a-half broad. It is surrounded by rocks, which extend to a distance of one mile on its south-western side. Near the centre of the island stands a small tower, and on the south-east end there is a large tree. The rest of the island is occupied by barracks, store-houses, and a cemetery. There is also a pier on the north-east side. About six cables south of the island there is a rock with 8 feet water and 7 to 9 fathoms a short distance east of it. This rock is marked by a black stone beacon 36 feet high.

Butcher Big Reef.

This reef is separated from Butcher Island reef by a channel two cables wide, with depths of 7 to 16 feet. The big reef is 1½ miles long N. N. E. and S. S. W., and a half-a-mile across; the middle part dries from one to 4 feet at low water. A red buoy with globe is moored in 22 feet near the western edge, and a red buoy with triangle in 18 feet near the northern limit of the shoal water off this reef.

Elephanta Island.

Elephanta Island, about one mile east of Butcher Island, is densely wooded, and has on it two hills separated by a deep ravine, the eastern 553 feet, and the western, in which are the celebrated caves, about 300 feet high. There is a pier on the north-east shore, which is the best landing place on the island. There is also a pier on the north-west shore which is used as a landing place for the caves. The end of this pier, which only just uncovers at low water, is marked by an iron tripod with a cage painted black, 10 feet above high water.

Elephanta Rock.

Elephanta Rock, having 6 feet at low water springs, lies two cables off the south end of Elephanta Island.

Shewa Beacon.

Shewa Beacon, a red masonry pillar, with a pole and cage on top, is placed on the east side of the channel between Elephanta Island and Hog Island. The height of the cage is 46 feet above low water spring tides.

Barnacle Rock.

Barnacle Rock, in the same channel, is marked by a black pillar 30 feet high.

Elephanta Spit.

Elephanta Spit, is a shoal spit of mud extending N. N. E., 7½ cables from the north end of the island. The end of the spit is marked by a buoy coloured black and white, surmouned by a triangle.

Hog Island.

Hog Island, lies about three quarters of a mile east of Elephanta Island on the south side of the entrance to Panwel river.

Wet Docks.
Prince's Dock.

The first stone of this extensive dock was laid by His Royal Highness the Prince of Wales on the 11th November 1875, and the dock was opened to traffic on the 1st January 1880. The dock has an area of 30 acres of water, and it is 1,460 feet long and 1,000 feet wide, with a jetty at the north end 700 feet long and 240 feet wide. The length of the berthage in the dock is 5,960 feet, and along the outer wall next the harbour 1,590 feet. There are two entrances, the northern 66 feet, and the southern 55 feet in width. The depth on the sills of both is 28½ feet at high water ordinary spring tides. The bottom of the dock has been excavated 3 feet below the sills.

There are fifty-one movable hydraulic cranes for working cargo, capable of lifting 30 cwts., through a height of 60 feet; and at the head of the jetty is a crane which is capable of raising 30 tons; also a 5-ton hydraulic capstan for warping vessels into the dock. There are also two capstans capable of sustaining a strain of 5 tons, and two of 11 tons for warping vessels at the entrances. Eleven closed transit sheds having an area of 331,260 square feet have been erected on the wharves, besides nine warehouses with an area of 139,160 square feet. Fresh water is laid along the wharf, and is available from numerous hydrants for ordinary use and in case of fire.

Victoria Dock.

Victoria Dock, in continuation of Prince's Dock, was opened 12th March 1888. It has an area of 25 acres of water, is 1,270 feet long and 1,000 feet wide, and has three jetties on its western side, each 400 feet long and 230 feet wide. The length of berthage in the dock is 7,425 feet. The communication passage with the Prince's Dock is 64 feet wide, closed by a Caisson.

The sea entrance is 80 feet wide. At high water, ordinary spring tides, there is a depth of 30¼ feet on the sill. The bottom of the dock is 3 feet lower than the sill.

There are fifty-seven moveable hydraulic cranes for working cargo, capable of lifting 30 cwts., through a height of 60 feet; in the south-east corner of the dock is a 20-ton crane, and on the south jetty is a crane which is capable of raising 100 tons through a height of 40 feet. Ten closed transit sheds, having an area of 307,642 square feet, have been erected on the wharves, besides four warehouses with an area of 129,600 square feet.

Sassoon Dock.

The length of the Sassoon Dock is 632 feet, width at entrance 40 feet, depth over sill at high water ordinary springs 22½ feet.

Government new Basin.

The Government new basin, which is now approaching completion, has an area of 4¾ acres, with an irregular perimeter of 1,892 feet. The length of the berthage is 1,500 feet. The width of the entrance is 60 feet; and the depth of the sill at high water ordinary spring tides is 23 feet. The bottom of the dock has been excavated 2 feet below the sill.

The Torpedo Dock is in the south-west corner of the basin.

Mercantile Graving Docks.	Length over all.	Width of entrance.	Depth over sill at high water, ordinary springs.
	ft.	ft.	ft.
B. I. Mogul	413	60	15½
Merewether	457⅝	65½	28¼
Viegas Patent Slip Cradle	232	......	......
P. & O. Dock	495	66	18

Time-ball.

A time-ball is dropped by electricity from Colaba Observatory daily, Sundays excepted, from the clock tower of the Prince's and Victoria Dock offices at noon, Bombay mean time, or 19h. 8m. 44·3s., Greenwich mean time. Ball hoisted close up five minutes before signal. In case of failure of the ball to drop correctly, a flag will immediately be hoisted and the ball will be dropped again at 2 p.m., Bombay mean time.

A time ball is dropped by electricity from Colaba Observatory daily, Sundays excepted, at Bombay Castle at 1 o'clock P.M., Bombay mean time, or 20h. 8m. 44·3s., Greenwich mean time.

Ball hoisted close up five minutes before signal. In case of failure of the ball to drop correctly, a flag is immediately hoisted and the ball is dropped again exactly at 2 P.M., Bombay mean time; but the time of re-droping the ball will be altered from 2 P.M. to 3 P.M., Bombay mean time, should the ball at the docks fail to drop correctly on the same day. The clock in the time-ball tower, having a centre seconds hand, beats every two seconds by means of an electric current in unison with the clock at the Observatory at Colaba, and indicates practically the exact Bombay mean time.

Water.

Fresh water is supplied by the Port authorities from their steam tank vessel.

Supplies. Supplies of all kinds are obtainable in Bombay.

Coals. Coal can be obtained in large quantities from several firms in Bombay, some of which keep in store 2,000 to 20,000 tons, and are supplied in bulk from barges.

Imports. The imports consist of kerosine oil, cotton, coal, piece-goods, grain, bricks, &c.

Exports. The exports consist of cotton, piece-goods, twist, yarns, grain and gums, hides, opium, &c.

Shipping. During the financial year 1891-92, 1,380 steamers and 31 sailing vessels entered the port with an aggregate tonnage of 2,035,742 tons. During the same year the clearances amounted to 1,273 steamers and 16 sailing vessels with an aggregate tonnage of 2,022,629 tons.

Pilots. The direction and management of the port, pilotage and docks under the control of the Trustees of the Port are vested in the Port Officer. The Pilot Service consists of fifteen licensed pilots.

The Pilot Schooner. The Pilot Schooner is a fore-and-aft rigged vessel, painted black, with a ribbon or band two inches wide close above the covering board, the number being painted in large white figures on each bow. During the day, a red and white horizontal flag is hoisted at the foremast head when vessels are in sight; and during the night the usual pilot signal is exhibited. During the S. W. monsoon and bad weather the schooner cruises between outer light-vessel bearing S. E. 2 miles, and Khandari Island bearing S. E. 5 miles, the position between these bearings being known as the outer station. In very heavy weather, when the vessel is compelled to leave the outer station, she cruises between Sunk Rock and the outer light-vessel.

Anchorage. The usual anchorage is on the west side of the harbour abreast the town of Bombay; but good anchorage may be obtained in any part of the harbour. The anchorage for vessels of war lies between the Castle and Sunk Rock, and the several moorings are marked by buoys.

All vessels should be moored, as a general rule, S. S. W. and N. N. E. There should be 60 fathoms on the S. S. W. anchor and 45 fathoms on the N. N. E., anchor. Vessels moored in the eddies off Middle Ground should have 75 fathoms on the S. W. anchor, all vessels being berthed in a sufficient depth of water to enable them to load to their deepest draught without touching the ground, and in a position to swing clear of all other vessels, fixed moorings, shoals and buoys.

Vessels arriving without a pilot shall anchor to the eastward of the Sunk Rock light.

Vessels which are intended and are ready on arrival to be placed in the wet dock, but which cannot enter the dock until the next flood tide, may be placed at single anchor off the dock channel, or as near thereto as their draught of water will admit; and may, after receipt of an order from an officer of the department, be left by the pilot in charge of the commander; but in no other case shall a pilot quit an inward bound vessel after once taking charge, until after the vessel is received into dock or berthed in the harbour.

Vessels intended to be placed in the wet dock, but which on arrival are of heavier draught than the depth of water at the dock entrance will admit, or from other circumstances may not be able to enter the dock within 24 hours, shall be moored or placed at single anchor in the harbour as may be ordered.

Vessels arriving with or taking in gunpowder should be anchored not nearer than one mile S. E. from the Middle Ground, or in stormy unsettled weather not nearer than one mile from the easternmost shipping with Cross Island, not bearing westward of N. W.

Vessels arriving with or taking in dynamite, nitroglycerine or other explosives shall, in the absence of special orders, be anchored not nearer than 1½ miles south-eastward of the Sunk Rock light.

Vessels remaining below the Middle Ground over 24 hours shall be moored, unless the commander signifies in writing his readiness to take charge of the vessel at single anchor.

Quarantine Ground.

Vessels arriving in harbour which are liable to quarantine under the regulations, or which may be detained in quarantine, shall anchor within the following limits:—Sunk Rock Light-house, in transit with Prongs Light-house and the Dolphin Light-house, bearing from N. W. to N. N. W., in from 32 to 36 feet of water at low water spring tides, and distant from 1¼ to 2 miles from Sunk Rock Light-house.

Tide.

It is high water, full and change, at the Apollo Bunder at 11h. 40m.; at outer light-vessel at 0h. 20m.; at Prongs Light-house at noon; at Mazagon at 11h. 30m.; at North Karanja buoy at 0h. 30m.; at South Karanja buoy and all along the eastern shore at 0h. 30m. The tide coming out of Pen river is met at Nocar Point, when it is high water, full and change, at 0h. 25m.

In Bombay harbour springs rise 14½ feet except at extraordinary springs, when the rise is sometimes as much as 18 feet: neap tides rise 11½ feet. The velocity of strong springs between Thal shoal and the Prongs is 2½ to 3 knots per hour and 4 knots during the rains. In the entrance of the harbour the tide does not set fairly through the channel, but the flood stream sweeps over the extremity of the foul ground of Thal shoal eastward towards the opening leading past Gull Island to Pen river. During the rains in the south-west monsoon the ebb sets strong out of Pen river to the westward, which greatly assists vessels in working out of the harbour.

The tides are subject to a large diurnal inequality, which may either accelerate or retard the time of high and low water, sometimes to the extent of an hour or more.

From September to March the night tides are higher than the day tides; in December and January, at spring tide, the difference is 2 to 3 feet. From March to September the day tides are higher than the night tides, the difference being greatest in June and July at springs.

Flood tide.
Eastern Shore.

At the outer light vessel the flood sets E. S. E. to E. N. E., taking a more northerly direction as the tide strengthens; to the westward of Thal land N. N. E. until the mouth of the Pen river is opened, where it takes a more easterly course; and from thence along the shore of Karanja from E. N. E. to N. E., until it reaches the North Karanja buoy, where it sets more easterly, or about N. E. by E. ½ E. After rounding Butcher Island beacon it sets N. by E. between Butcher Island and Elephanta. After passing Butcher Island the flood stream sets in a N. E. direction towards Trombay. Midway between Butcher Island and Pan Pir (Trombay) the two streams meet, setting from N. to E. N. E.

Western Shore.

Off the Prongs the first of the flood sets E. S. E., and as the tide makes stronger it sets N. E.; east of Prongs and thence to Sunk Rock N. E. by N., from Sunk

Rock to Cross Island, inside, inside the Middle Ground, it sets from N. by E. to N. N. E.; and from a position immediately east of Cross Island to abreast of Mazagon from N. to N. by E.; and from Mazagon to where the tides meet between Pan Pir and Butcher Island N. E. to E. N. E. From Sunk Rock to Mazagon and to the eastward of the Middle Ground, the flood sets N. by E. to N. N. E. until off Tucker Beacon, where the tide separates and sets more easterly, and more northerly withal.

From Uran Beacon towards the Shewa Beacon, the flood tide sets N. E. by E. to E. by N. until it reaches the Barnacle Beacon, east of Elephanta Island, where it takes a N. N. E. course; north of Hog Island it takes a more easterly course.

Ebb Tide, Eastern Shore.

From Hog Island the tide sets S. S. W. until the south point of Elephanta, where it turns sharp to the westward and W. by S. until the channel between Elephanta and Butcher Island is opened out, where it sets S. W. ½ W. and so continues along the Karanja shore as far as the South Karanja buoy, when it takes a south-west course as far as the mouth of the Pen river, where it sets about W. S. W. nearing the Thal; and it sets S. W. to S. S. W. and more southerly as it proceeds south, until it sets nearly due south; between Thal and the outer light vessel the ebb tide sets S. W. by W.

Western Shore.

From Trombay to Mazagon the ebb tide sets from S. W. by W. to S. S. W. and from Green Island towards Mazagon S. W. ½ W. From Mazagon to the eastward of Cross Island the ebb tide sets S. by W. From Cross Island to the inside of Middle Ground the ebb tide sets S. S. W. and from thence to Sunk Rock S. by W., and from the Sunk Rock to the Prongs the ebb tide sets S. W. Abreast the Prongs the ebb sets from W. by S. to W. by N. As the tide strengthens the course of the ebb stream changes from W. S. W. to S. S. W. East of Cross Island and Middle Ground in mid-channel the ebb sets from S. by W. to S. S. W. and from south of the Middle Ground to Sunk Rock it sets S. by W, but at the first of the ebb the set is here more westerly. At neap tides the set is nearly the same but not so strong, and between Sunk Rock and the light vessel the set is more easterly, particularly in the month of September, after heavy rain. The set of the ebb at the outer light-vessel is from E. to E. S. E.

The Stream of the Ebb Tide.

The stream of the ebb tide on the western shore of Bombay Harbour makes down during ordinary tides 30 to 35 minutes earlier than on the eastern, and during strong spring tides from 40 minutes to one hour, which causes a greater rise of from 4 to 6 inches on the western shore.

In shore of the Flagstaff shoal during the S. W. monsoon, the ebb stream makes about three-quarters of an hour before high water. This is important in docking vessels at the Government Dockyard.

The direction of the tides at the entrance to the harbour is entirely changed by strong winds.

Fishing Stakes.

Fishing stakes are not allowed to be placed in the approaches to Bombay Harbour within the following prescribed limits:—Within the space bounded on the east by the western port limits; on the north by Prongs Light-house bearing east; and on the south by Khandari Island Light-house bearing east. Fishing stakes are not allowed to be placed within the ranges of visibility of either Prongs or Khandari Island lights outside the 10 fathoms line of soundings. North of the Prongs and south of Khandari Island light, fishing stakes are placed inside the 10-fathoms line of soundings within the range of visibility of those lights. Mariners are therefore cautioned of the danger incurred should they approach near the 10-fathoms line either northward or southward of the limits, more especially as the fishermen sometimes place their stakes as far out as 11½ fathoms within those limits.

Within the port limits, the fairway to the anchorage is kept free from fishing stakes, except the line of them 2½ miles N. E. of Thal shoal.

Directions approaching Bombay.

From March till the S. W. monsoon begins in the end of May or early in June, and again after the rainy season in the month of October, the winds off this coast are principally N. W. veering to W. N. W. or W. from the forenoon towards sunset, then N. W. till midnight, and to N. N. W. or N. from midnight till the forenoon. When steering for Bombay Harbour, from the middle of May till August, steady gales and clear weather will be experienced at times, until within 70 or 90 miles of the coast; but cloudy weather with rain and squalls may be expected on the banks of soundings as the land is approached.

If not certain of the latitude, it will be prudent to keep between the parallels of 18° 15′ and 18° 25′ N. and endeavour to get soundings on Direction bank, after passing over the 50-fathoms flat.

During the early part and strength of the S. W. monsoon great care must be observed not to get northward of the entrance of the harbour, for there the flood tide, as well as the heave of the southerly swell, frequently set vessels along the bank towards the Gulf of Cambay, and late in May, June, and July, it would be found difficult to work round the south-west Prong. Therefore in these months a course should be steered direct for Khandari Island, allowing for a northerly set on the flood tide, though the prevailing current outside the depth of 30 fathoms off the harbour, after the first burst of the monsoon, is to the southward, and endeavour to make the island bearing between E. and S. E., bearing a little either way, as circumstances may require, to carry a fair wind in entering the harbour. If the wind incline to blow in squalls from W. to W. N. W. do not run too close in with the land to the southward of Khandari Island, nor even approach that island too near, as there might be difficulty in weathering it with these winds, which are sometimes experienced in June and July, but more expected in August. From November to February land and sea breezes generally prevail. The land wind lasts from about 9 to 10 P.M. to shortly after daylight, and the sea breeze from 10 A.M. or noon to sunset. During the interval between the land and sea breezes in the forenoon, a heavy smoky haze frequently hangs over the land, obscuring everything from view, so that great care should be exercised when approaching the land shortly after daylight in these months. This haze also occasionally occurs during the calm hours of the evening.

From the Southward.

From the southward a vessel should not shoal into less than 12 or 11 fathoms between Port Chaul and Khandari Island, as in the vicinity large fishing stakes extend some distance from the coast. When Khandari Island bears southward of east a course may be steered for the outer light vessel, which can be passed at a convenient distance on either side; thence a N. E. ½ N. course will lead to the anchorage east of Sunk Rock, or proceed further up the harbour to the usual mooring ground abreast the city. At night the white sector of Sunk Rock light leads east of the foul ground extending from Prongs Light-house.

If, in edging to the eastward to give a wide berth to Sunk Rock shoal· a vessel gets so far over as to obtain a shoal or hard cast on the edge of Karanja shoal, haul off directly to regain the fair channel on the western side of the harbour. This shoal is not, however, so steep in this part as it is farther up abreast Little Karanja Hill.

With the wind at W. or W. by N., it will not be prudent to make free with the eastern side of the harbour, either towards Thal reef or Karanja shoal; therefore do not bring Khandari light southward of S. by E., until the vessel is northward of that shoal, nor to the westward of S. by W. when abreast Karanja shoal.

Turning to windward, do not open Cross Island east of Sunk Rock until the outer light-vessel bears W. by S. A vessel will then be north of Thal shoal, and may stand to the eastward until Thal Knob beacon is in line with Tarhur peak, bearing S. by E. ¼ E., when the depths will be 3¼ to 4 fathoms, being careful to avoid the fishing stakes 2½ miles north-east of Thal shoal. It must be borne in mind, however, that Cross Island is often very difficult to recognise, as it is usually surrounded by shipping.

In standing from the Prongs towards the middle of Karanja shoal, the soundings will be a good guide, as they decrease gradually. When Great Karanja south brow bears southward of east, tack on shoaling to 5 fathoms at low water or 7 fathoms towards high water. But with Uran Hill bearing east or southward of east, the sounding will not be such a guide. Care is, therefore, necessary not to approach too near the north-west extreme of Karanja shoals. In this part the east side of the harbour is the deeper and shoals gradually towards the Middle Ground; whereas southward of Sunk Rock the west side of the harbour is the deeper, and thence it shoals towards Karanja.

When Sunk Rock bears N. W. by W. ¾ W., a vessel will be north of the red buoy with the globe abreast the southern part of the Karanja reefs. Thence the eastern turning mark will be Butcher Island tree in line with Trombay ruin until Middle Ground bears N. W. by W. ½ W.

Generally vessels are moored on the inner side of the Middle Ground shoal, and from there up to abreast of Cross Island; but when the harbour is crowded some vessels moor further out in the stream of that shoal, as the raising of it above the level of high water to form the battery has caused the tide streams in its vicinity to run with greater velocity. It would not be advisable for a stranger to pass within Middle Ground shoal to the shipping in the night, but to anchor before Sunk Rock light bears S. W. by W., or, if necessary, farther out between Sunk Rock shoal and the entrance of the harbour where the sea is broken by the reefs.

The port rules forbid any vessel, if above 200 tons, to enter, leave or be moved in the port without having a pilot, harbour master, or assistant to the port officer or harbour master on board.

When the wind is northerly, vessels generally work up between Karanja shoal and Middle Ground shoal; then pass round the north end of the latter in proceeding to their moorings. This is the most convenient with a northerly wind and flood tide.

The channel between Middle Ground shoal and the north part of Karanja shoal is about 1½ miles broad.

From the Northward.

Do not shoal into less than 12 fathoms until Prongs Light-house bears northward of east, when a course may be steered for the outer light, whence proceed as directed. Turning to windward do not open Khandari Island east of the outer light vessels until North

Pap and Thal Knob beacons are in line bearing S. E. by ¼ E., and when Prongs Light-house is in line with the west extreme of Malabar Point proceed as before for the anchorage.

Inshore Channels, South Channels.

Vessels proceeding through the South Channel should, after passing west of the buoy east of the North Patch, steer to pass the South Channel beacon at a distance of half to three-quarters of a cable, when a transit post 20 feet high and surmounted by a ball near the south corner of Mody Bunder, in line with a similar post 39 feet high and surmounted by a triangle near the north corner of the Bunder, will lead along the east side of the channel in 9 to 12 feet water.

The ball should be kept a little east of the triangle, as there are two 3-feet patches very close to the east of the line of the leading marks.

North Channel.

The transit post near the north corner of Mody Bunder (which forms the back transit mark for the South Channel) is the front mark for the North Channel, and, kept in line with a third transit pole 39 feet high and surmounted by a drum further at the back, leads through in 7 feet of water and clear of the North Channel beacon, all transit marks and posts being painted red.

Lights.

Fixed red lights are exhibited by night on the posts over the marks from 1st of September to 31st of May in each year. The light on the triangle mark is in every case the highest light. The light at the ball mark will be screened from view in the North Channel, and that at the drum mark from view in the South Channel.

Prince's Dock Channel.

The dredging operations in this channel alter both the depth and shape of it by bringing the scour from the passage west of Butcher Island across the N. E. and S. W. extremes of the bank. The leading mark for the centre of the channel is a disc on the small flagstaff on the north side of the north entrance to the dock, in line with a double disc in the background bearing W. ¾ N.

Lights.

The beacon on the north end of Cross Island Spit is about 100 feet south of the Prince's Dock channel, the limits of which are defined by two cones on poles on the north side and two drums on poles on the south side. When the dock gates are open a light is exhibited from the tower on the island at the entrance of the Prince's Dock with a red ray over the south side of the channel and a white ray over the centre. At the same time another light is exhibited from the tower on the north side of the entrance with a green ray over the north side and a white ray over the centre of the channel.

Victoria Dock Channel.

The marks to the eastward of the North Channel beacon are the same as for the Prince's Dock; after which the leading mark is a disc on the north side of the entrance to the dock in line with the lattice work signal staff of Victoria Dock.

Lights.

When the dock gates are open a red light is exhibited in the place of the above disc, and two red lights vertical from the signal staff.

Malet shelf.

A rocky patch 4 feet above low water springs, situated close to the foreshore about 3 cables north of Prince's Dock entrance, has a beacon on it surmounted by an iron drum, and is 28½ feet above low water springs.

Direction for Working out of the Harbour.

During the S. W. monsoon the spring tides are favourable for working out of Bombay Harbour, as the freshets produced by the rains then set strongly out of Pen river, directly between Thal reef and the S. W. Prong, and greatly assist in working out; whereas the ebb tide is weak at neaps, and with baffling light winds occurring between the squalls and a heavy sea rolling in, vessels are frequently prevented from getting an offing.

In working out of the harbour in June or July, or in blowing, unsettled weather, keep the entrance open when the pilot leaves by working with Prongs Light-house whilst visible, bearing from N. by E. to N. N. E. ½ E.; the flood tide and swell will then drive a vessel, if there be little wind, into the harbour, and prevent being drifted to northward of it, or from being necessitated to anchor outside. This cannot be done in the S. W. monsoon without the risk of losing the anchor, and probably greater loss may be sustained.

When outside of Thal reef the water will deepen in standing to the north-westward near the S. W. Prong, and will shoal in standing to the southward if approaching the flat off Khandari Island. That island should not be approached within 3 miles. In June and a great part of July, as the squalls come mostly from the west-south-westward, work to the south with the ebb, as the following flood will not then be felt so strongly as near the reef, and a considerable stretch may be made to seaward if the wind will admit taking care not to get to northward of the S. W. Prong by keeping the light-house on it northward of N. E. by N. If bound southward, after getting into 20 or 22 fathoms water, continue to stand along the coast if the depth does not decrease, observing to make a stretch to the north-westward at times when the wind is favourable into 35 or 40 fathoms, when a vessel may safely proceed southward, occasionally sounding, to be certain that the depth does not decrease.

In August it is seldom difficult to get an offing, for the squalls draw to the northward of west and the freshets usually set strong out of the rivers, when at times a vessel may stand from the harbour direct to the southward without tacking, this having also happened in June and July, although seldom. In August it is not so dangerous to get northward of the S. W. Prong, although still advisable to keep the entrance of the harbour open. In this month, when bound southward, it is not necessary to obtain a great offing in the parallel of Khandari Island; but after rounding that island stand along the coast if the wind permit to increase the depth of water; otherwise a tack at times must be made until it is increased to 30 or 35 fathoms.

DIRECTIONS FOR SLOW STEAMERS.

The class of tramp steamers of inferior power that visits Bombay finds it tedious to steam across the Arabian Sea from east to west from June to the end of July. Standing straight across in this class of steamers is certainly not advisable. When the chief officer of a steamship of 1,000 tons register and a speed of 8 knots left Bombay on 15th June for Aden, heavy monsoon weather and incessant showers of rain prevailed. The master shaped his course straight across, the sea being moderate on the bank of soundings and while the rain lasted; but it afterwards became so bad with mountainous seas that the engines could only be put slow ahead. Towards the end of the month, when getting short of coals, the vessel being a complete wreck on deck and having 6½ feet water in the main hold (in the engine-room the water was nearly up to the fires) put back to Bombay and jettisoned the cargo in the forehold, she being by the head on account of water in the fore and main holds. In discharging, six heights of bags were damaged and had to be put into hopper barges and taken out to sea. These bags looked apparently all right, but as soon as they were touched they fell to pieces and threw off an almost unbearable odour.

In examining the chart of the master who commanded this steamer the previous monsoon, I found that after leaving Bombay he steered to make the land on the Arabian shore between Ras Madraka and Kuria Muria and work close along to the shore up to the Gulf of Aden. In July two steamers were bound across, one of them taking the northern track, the other the southern. The first to arrive at Suez informed the other by letter of the weather encountered. I have never been able to find which of them arrived first. The southern track is to pass over Direction bank and steer to get in the position of Lat. 9° S. and 70° E.; then set the next course to get in 7° S. and 60° E.; then shape the next course for Cape Guardafui, steering across between the two former positions. The weather is usually fine, from light to moderate winds and smooth sea. Steamers of late report small cyclones in the monsoon months, but they are not so frequent in this sea as in the Indian Ocean.

The disasters due to cyclones in the Arabian Sea are the S. S. "Speke Hall," foundered in May 1885; the German man-of-war "Augusta," and the French man-of-war "Renard," foundered in the Gulf of Aden. In June 1887 the steamer "Lamport" from Bombay foundered with all hands. In the case of the "Speke Hall" only the second officer was saved, having remained for three days on a plank with numerous sharks around him, until he was rescued from that perilous position by a passing French steamer.

CHAPTER VII.

KARACHI.

MANORA fixed light, in Lat. 24° 47′ 37″ N., Long. 66° 58′ 6″ E., is a first order dioptric white light, showing with full brilliancy to seaward on an horizontal arc of 180°, that is from N. W. by W. to S. E. by E., the landwards semi-circle being partially screened by a dioptric mirror which intensifies the light to seawards.

The focal plane of the light is 152 feet above mean sea level, and visible in clear weather from a steamer's bridge 20 nautical miles.

The tower adjoins Saint Paul's Church to the northward with sixteen yards interval between, built of drab-coloured stone (but whitewashed on the seaward half), and 91 feet in height from ground to top of coping.

Directions approaching the Port—Coast of Sind-Indus bank.

Sailing Directions.

The coast of Sind should be approached with great caution. Too much attention cannot be paid to the lead, more especially in passing the banks of the Indus, which extend considerably to seaward. It was surveyed by Lieutenant A. W. Stiffe, late I. N., in March 1877. The edge of the shoal water is 3½ miles to seaward of the former position. It is now in Lat. 24° 4′ 20″ N., Long. 67° 11′ 50″ E. By night a vessel should give the banks a berth of 15 to 20 miles, and after passing the "Swath" she does not get less than 18 to 20 fathoms. She may haul to the northward, not coming into less than 15 fathoms until Karachi light is seen. By day the breakers in the edge of the banks are a good guide unless the water is quite smooth; but it is hardly possible for a vessel to run ashore by day on account of the marked discolouration of the water, which extends some distance outside the banks.

Tides.

The tides during the springs are strong, and the flood sets to the S. E. and the ebb to the N. W.

From February to the end of the monsoon a strong south-easterly current may be expected, running at a rate of 15 to 45 miles a day.

During the S. W. monsoon vessels should make Ras Mauri (Cape Monze), which is 13 miles W. ½ N. from Manora light-house, and keep to windward of the port if the weather is thick or if the tide does not suit for entering the harbour. Allowance must also be made for a strong set to the S. E. which prevails more or less during the S. W. monsoon. Do not bring Manora Point to the southward of E. by N. or go under 15 fathoms near Cape Monze.

Masters of ships should endeavour to make the port at daylight, and can with safety approach into 8 fathoms to about 2 miles distance from the light-house, keeping it on any bearing from N. by E. to E. N. E. and heave-to for a pilot.

Outer anchorage or anchorage in the Roads.

From June to the middle of September ships should not on any account anchor, but stand off and on, keeping the light-house bearing from N. N. E. to N. E., one to 2 miles distance, until boarded by a pilot or directed by signal.

Anchorage.

From September to the end of March anchor with light-house N. by E. to N. N. E., distance one mile, 6 to 7 fathoms, or Trinity Church Tower, or with end of breakwater.

In April and May anchor with light-house N. N. E. to N. E., distance 1½ miles, 8 fathoms, or Trinity Church Tower, or with Manora Point.

Karachi Harbour Directions.

In supersession of former directions for Karachi Harbour, dated 1st October 1886, the following, with reference to draught of vessels, &c., is notified for general information :—

Tides.

	H.	M.
High water, full and change	10	30
	Ft.	In.
Average rise and fall, spring tides	9	6
Do. do. neap tides	5 to 6 feet.	
Depth of water in entrance channels—		
Spring tides	31 feet.	
Neap tides	26 to 27 feet.	

S. W. Monsoon.

Draught of vessels entering or leaving the port spring tides during the S. W. monsoon—

Maximum draught allowed ... ... 27 feet.

Neap tides, S. W. monsoon, must be regulated by the state of the weather.

Fair Season.

There should be at least 2 feet of water under the ship to insure her steering.

State of Tide for entering Port.

Sailing vessels should enter port on the ebb tide. Steamers can enter either on the flood or ebb at the pilot's discretion.

Masters of vessels should not on any account attempt to enter the harbour without a pilot.

Time Ball, "Merewether Pier"

The time-ball is dropped daily (Sundays excepted) at 1 o'clock, Karachi mean time.

Position of Ball Tower, Lat. 24° 49′ 11″ N., Long. 66° 58′ 00″ E.—

	H.	M.	S.	
Ball is hoisted close up at	0	55	C0	p.m.
Dropped at Karachi mean time	1	00	00	„
Long. (66° 58′ 00″ E.) in time	4	27	52	„
Equivalent to Greenwich mean time	20	32	8	

Should the ball fail at 1 P.M., it is again dropped at 2 P.M., Karachi mean time, equivalent to 21 hours, 32 minutes, 8 seconds, Greenwich mean time.

Harbour improvements.

Among the extensive works executed, a breakwater has been built, running out from Manora Point in a S. by E. direction to a distance of 1,500 feet into 5 fathoms of water. This affords complete shelter to the entrance channel during the S. W. monsoon; also a channel has been opened through the entrance with a depth of 21½ feet at low water spring tides, 500 feet in breadth. The channel is marked by buoys, red on starboard hand, black on port.

The Merewether Pier, 312 feet in length, has 26 feet at low water alongside.

The Erskine Wharf, 2,008 feet in length, has accommodation for five vessels of the largest class.

Breakwater

An improved red light of the all-round anchor pattern of ship's light is exhibited at the entrance end of the breakwater, brightly visible in clear weather 5 nautical miles, and at least half that distance during the S. W. monsoon.

The height of this light is 54½ feet above mean sea level, and it is maintained throughout the year.

Caution.

An electric light is used for working steamers alongside the Merewether Pier and Erskine Wharf. The height above the mean sea level is 67½ feet, and would be visible from westward 15 miles. The position of this light being north 1¼ miles from the light-house on Manora, commanders of vessels are warned not to mistake it for the fixed light.

Note.—Mail steamers arriving off the port at night should burn two lights in quick succession; other vessels, one or two at intervals of two minutes. During the fair season pilots will board, but during the monsoon they must keep off the port until daylight.

Remarks.—Vessels in the N. E. monsoon sometimes make a better passage to Karachi than to Bombay. I consider the former a much better port to make in the S. W. monsoon than the latter, as sights are obtainable most of the time. After passing the line of strongest and apparent course of the rain cloud from Africa, which terminates in about 20° N., little or no rain is met with, although the monsoon may be strong.

Winds: Sind, Kutch, and Kathiawar.

The summary of winds and weather on the coasts of Sind, Kutch, and Kathiawar, by Commander Grieve, R. N., will be useful to the navigator.

January.

In January there are steady land and sea breezes between N. N. W. and N. E. The north-easters on the coast of Sind and Kutch frequently blow for three or four days at a time. Southerly winds are rare, but the sea breeze occasionally veers to S. W., and squally weather with rain sometimes occurs near Karachi.

February.

In February winds become more variable, and the north-easters less frequent and of shorter duration. Sea breezes prevail between W. S. W. and W. N. W., and towards the end of the month you may get a hard blow from the westward for two or three days, particularly on the northern part of the coast.

A heavy sea always accompanies these breezes, rendering the anchorage off Karachi in the outer roads very unsafe.

March.

In March land winds become less regular and sea breezes are generally moderate between W. and N. W., and blow very hard at times with thick, misty weather.

April.

In April winds are much the same as in March, weather being generally hazy with a very damp atmosphere; with a swell from the westward at times.

May.

In May wind is moderate from west to W. S. W.; weather hazy with very heavy dews; clouds begin to gather, much swell prevailing from the westward.

June, July, and August.

In June, July and August the S. W. monsoon prevails, blowing moderate and fresh breezes from W. to S. W. by W., with passing clouds and hazy weather. It becomes very cloudy as the season advances. Rain is uncertain, but may be looked for in the latter half of July, and when it falls, it is generally accompanied by variable winds and thunderstorms. A heavy swell prevails during these months.

September.

In September winds are light from W. to S. W. and squalls from the land may be expected. The weather is generally hazy and the monsoon swell not quite subsided.

October. In October winds are W. to N. W., light with occasional calms. Land winds begin to get steady about the latter end of the month. Weather generally clear and pleasant, but occasionally dense fogs issue from the land : sea smooth.

November. In November land and sea breezes become steady, veering from W. to N. W., the land winds towards the end of the month often lasting two days at a time, but are not very strong. The weather is generally very clear, and objects are visible at a great distance. Remarkable terrestial refraction prevails during this month and the next, making distant objects appear close.

December. Winds and weather nearly the same as described for January. Nor'-easters prevail and the weather is cool : atmosphere remarkably clear.

MUSCAT.

Muscat is the only port on the N. E. side of Arabia of any importance.

It is governed by a Sultan, and a British Resident resides there. The weekly British India mail steamers call there, and occasionally the Bombay and Persian steamers.

There was no telegraphic communication up to 1890, and I am not aware of a cable having been laid since. In 1895 the Bedouins of the desert raided the city and plundered it. They entered by twos and threes, and when the whole tribe were in, suddenly made an attack. It is said that it was their intention to kill the Sultan after looting his palace, but he saved himself by quietly giving up his treasure. They did not touch the property of the Banias, an enterprising race of Indians, who are the principal traders. These Bedouins recognise no law, any and everything coming within their reach being considered their own. It was the impression a few years back that if a shipwrecked crew were to be cast on shore in certain parts of Arabia between Aden and Rasel Hadd, they would in all probability be carried inland and made slaves.

In 1891 the Savie brothers, of Seychelles Island, with five boatmen, left Port Victoria for Bird Island, one of the group, to collect birds' eggs. They were driven out to sea and lost their course and during the strength of the S. W. monsoon they drifted before it for a distance of about 1,400 miles, making for Arabia in the vicinity of Kuria Muria Islands. Three of the boatmen succumbed to exposure and starvation before reaching land, the remainder being on the very last stage of starvation when the boat touched the beach, where a lot of Bedouins had collected. The two remaining boatmen were father and son, the former expiring immediately after landing, and the latter, being separated from his employers, was made a slave. On their recovery, the Savies, who are French Creoles, were made to understand by signs that they were the only survivors, which they believed, having landed in a delirious condition. After a time they were taken to Muscat, a month's journey, on camels. Their rescuers were rewarded by the British Resident, who forwarded them to Bombay at the expense of Government. After innumerable delays they eventually reached their home, about twelve months from the time of their departure. These gentlemen, not knowing that any of their men were still alive, reported them as all dead. L'Espoir, the third survivor, a strong, robust young Mozambique, was also ignorant of his masters' fate. He was made to fish and move about from place to place with the tribe. On a favourable occasion he was stolen by some men of a neighbouring tribe and taken to Muscat, where these sons of the desert were also rewarded. He was sent on to Bombay in H.M.S. "Cossack," and I granted him a free passage to Mauritius, where Government took charge of him and sent him to his country,

SAILING DIRECTIONS.

Approaching Muscat from seaward, if from the eastward or westward, Saddle Hill, 1,340 feet high, is visible. It consists two sharp peaks, the highest of the very jagged dark range behind Muscat. These appear one when bearing W. S. W. The place has often been ignored by strangers, especially steamers, as the towns do not show well under the dark hills. There is no danger on this part of the coast, and steamers especially should not keep far out, as Fahil Island cannot be mistaken. This islet, 280 feet high, is steep all around, has no danger near it, and generally presents a light colour against the land. In the day time a ship should run into Muscat cone and anchor well over to the west shore, which is the weather side in a nor'-wester. The place is nearly open to the nor'-wester, which blows a couple of points off the west side. The north-east also sends a heavy sea into the cone, and there is little or no shelter from this wind. A vessel arriving by night from the eastward should run up the coast, keeping to the southward of the parallel of Ras Muscat, or make short tacks up to it so as to be sure of not passing it, the first point being rounded as near as possible. From the westward or northward a vessel should make Fahil Island and take its departure thence, the course and distance to Fisher's Rock being S. E. by E. ¼ E. 6 miles. In Muscat cone it is high water, full and change, at 9h. 15m., and the rise and fall is 6 to 8 feet (approximately.)

CEYLON.

Colombo, the commercial capital of Ceylon, is a port of much importance, and the only one I shall cite. I can well remember this port when a number of small vessels used to find employment to the rice ports of Bengal and Burma in the season, and afterwards to load a general cargo to London or New York with payable freights. Looking back to the past when this class of vessels used to ride bows under in the roadstead of Colombo in the monsoon season, and at the present day to see the large four-masters moored bow and stern, large ocean steamers going and coming at almost every hour of the day—why the change is marvellous.

The mail connections between Mauritius, Colombo and Galle have been of long standing. Many years ago the mails were carried between the two islands in fast clipper schooners and barques, but shortly before the advent of steam the barque "Robert Passenger" figured as about one of the last of the sailing mail ships.

The general sailing directions, corrected up to 1883 by Captain Donman, Master Attendant of Colombo, are condensed from Captain Marshall's Hand-book.

In making a landfall.

Strangers to the port may know Colombo on making the low land of the coast, when approaching from the westward, by the tope of straggling fir trees on some high ground at Mutwal, on the north side of the harbour. These trees are the first objects visible on the coast line. Shortly after they are discerned the high spire of All Saint's Church (about a mile to the southward) will be seen, and then the light-house

Clock Tower and flagstaff. In approaching from S. W. Mount Lavinia House, which is a large white structure built on a knoll at the seaside, about 7 miles south of Colombo, will serve as a useful landmark. Should a landfall be made in thick rainy weather on either side of the port beyond sight of it, a cast of the lead will determine whether the ship is to the northward or southward as, when close in shore, the water is deeper to the south of Colombo than to the north as per chart. For instance, take a line running parallel with the coast at a distance of 4 miles. To the north of Colombo that line would be in about 12 fathoms generally and to the south in about 20 fathoms. In clear weather the high mountains of the interior are seen a long way off, and notably Adam's Peak—a sharp conical peak rising from the centre of a high range of mountains to an elevation of 7,352 feet—may be seen at a distance of 90 to 100 miles. The peak is 45 miles from Colombo, bearing S. 79° E. true.

In approaching the Harbour at night.

In approaching the harbour at night commanders of steamers coming from the westward should, whenever the red light on the end of the breakwater is made out, bring it to bear E. by S., and then steer for it until the port-light on the Clock Tower bears S. E. by S. ½ S., when they should anchor if not intending to enter the harbour before daylight. In this position they would have 8 or 8½ fathoms water with good holding ground, and might anchor with safety even in the strength of the S. W. monsoon. In approaching from the southward, they should not come under 10 fathoms water until the red light bears N. E. by E., which would clear the Tartar patch, and then proceed as in the case of coming from the westward. If intending to enter the harbour at night, they should make the usual signal for a pilot when about three miles off the Port; and when they get into the position given for anchoring, they should heave-to with the vessel's head to the north-westward in the S. W. monsoon in order to make it safe for the pilot boat to go alongside on the leeside and wait till the pilot comes out, giving the vessel an occasional turn to windward to hold position; but in the N. E. monsoon they should stop the vessel in the position indicated and wait for the pilot.

The signal for a pilot will be answered from the Signal Station (flagstaff); and the pilot boat, in proceeding to the vessel in the offing, will show a flare-up light occasionally after passing the breakwater head. Vessels arriving off the port at night will not be boarded by a pilot before daylight unless a signal is made for one. In answering from the Signal Station the signal made for a pilot, should the pilot who may be on night duty consider it unsafe to bring the vessel into the harbour, two blue lights will be shown with an interval of a few minutes between each, and this would indicate that the vessel should anchor.

Commanders of Sailing Vessels.

Commanders of sailing vessels approaching the harbour at night with a fair wind should act in the manner recommended for steamers; and in working up from the southward against a northerly wind they should not, when on the port tack standing in shore, come under 10 fathoms water until they have the red light on the breakwater bearing to the eastward of N. E. by E.; but when they get into the position already given for anchoring they should anchor, as sailing vessels will not be brought into the harbour at night during any season of the year.

All vessels except native craft approaching the harbour in daylight will be boarded by a pilot when about a mile from the breakwater head.

Tides and Currents.

The current off Colombo is subject to considerable variation, and is influenced by the oceanic current which sweeps round the south coast of Ceylon, but it is never so strong as to inconvenience vessels making for the port. It runs parallel with the coast, being strongest in the northerly direction during April and May, and August, September, and November, when it has been measured to run at times two knots; but throughout the S. W. monsoons many days intervene without any perceptible current, and even in the strength of the monsoon it sometimes sets along the coast to the southward for a day or two. It never sets for many days in one direction, and is generally succeeded by a return current the opposite way. In December and January, when the strong long shore (N. N. W.) winds prevail a current of one and a-half knots may be found setting to the southward. Ships leaving Colombo in the S. W. monsoon with a northerly current would find it to their advantage to stretch right across the gulf on the port tack, as a northerly current on the Ceylon side of the gulf causes a southerly one on the Indian side and *vice versa.* There is no tidal current at Colombo, the rise and fall of tide being very small: 25 inches is the average rise and fall of spring tides in the year.

Monsoons and Weather.

The S. W. monsoon, or what is locally named the little monsoon, usually sets in from the 1st to 15th of May. It generally lasts a few days or a week, during which time a stiff breeze blows from W. S. W. with heavy squalls and much rain, after which there is, as a rule, a fortnight's fine weather until the big monsoon sets in, which is generally in the first week of June, when a repetition of the little monsoon weather takes place with more or less severity, but sometimes the little monsoon is the most violent. Throughout June, July and August a stiff monsoon blows with occasional lulls, and a heavy sea rolls in to the roadstead. Towards the end of September the monsoon moderates, and from the 20th October to 10th November the weather is usually calm with rain and land wind at night. About the 15th November the N. E. monsoon has steadily set in with fresh N. E. and northerly winds in the fore part of the day, veering round to N. N. W. in the afternoon, and blowing strong from that direction till 8 or 9 P.M. This sort of weather prevails to about the middle of February, when regular land and sea breezes set in and continue till the setting in of the S. W. monsoon. Towards the end of March and during April heavy squalls off the land in the evening with heavy rain, thunder and lightning frequently occur.

CHAPTER VIII.

FROM MAURITIUS TO AND FROM THE BAY OF BENGAL.

I HAVE frequently met shipmasters that are strangers to these waters who refuse charters for Mauritius, thence to a rice port up the Bay of Bengal, thinking that, after leaving Mauritius, they have to run south again to make easting, W. is not the case. A fair to a leading wind from any point between S. W. and N. W. through. Such is certain to be met between the Chagos Archipelago and Addoo Atoll, the southernmost Atoll of the Maldive Islands. This channel is nearly 280 miles wide. The current, as a general rule, sets to the eastward, assisting vessels to make easting, especially when the wind is light.

Equatorial and 1½° Channel.

The other two channels frequented are the quatorial and 1½° both nearly 60 miles wide. Here the current also sets east almost the whole year, but in June and July is accompanid by light S. W. winds, and to the westward of them I have experienced a westerly set from 3° S. to 2° N. of the eqnator. But this is quite uncertain; for one day it may be setting west, the next none, the third day it may be westerly again, and so on.

S. E trade near the Equator.

When the S. E. trade wind is advancing N. Easterly and even N. E., winds may be met as far as 2° N., in which case it would be impossible to pass through the above channels. Run north and pass in the 8° channel. This course it is a little longer, but a strong S. W. monsoon and easterly current will repay the extra distance. It is not advisable for a sailing vessel to pass through the Cardeeva Channel. I know of only two vessels which attempted this, the master of one having no liking for it.

Leaving in December.

Leaving or passing Mauritius in December to arrive in Bengal during the N. E. monsoon, westerly winds will be met between 4° and 2° S. Run your easting down in 2° or 3° S., the daily average run being from 75 to 100 miles per day. Cross the Equator in 87° E., or the usual crossing of vessels bound up from the Cape of Good Hope.

From the 15th March cross the Equator in 79° E. and steer to sight the Little Basses. Westerly winds prevail at this season, and I do not advocate sighting land any farther to the westward until late in March, as on several occasions after sighting the Great Basses I fell in with N. E. winds and had to beat about until the wind changed, and on one occasion had to re-cross the Equator.

The Admiralty information of the prevailing winds and currents off the south coast of Ceylon is from the memorandum of Mr. J. Boochanan, master of the Light-ship in 1869.

January.

During this month a strong, steady N. E. monsoon prevails. The S. S. W. current, never shifts, which but continues throughout January, has its origin in the Bay of Bengal with a velocity varying from two to three and a-half knots, the sea being cross and very rough the month. Steam vessels steering N. N. E. have remained in sight from the light-vessel for two hours and sailing ships for six days; hence ships bound N. E. should avoid the coast of Ceylon in January.

February

The same remarks apply to February, although towards the end of the month the wind becomes much lighter and the current also slackens. Occasionally also in this month the light vessel swings. In 1868, however, she did not swing until April, while in 1869 she swung in February. At the end of the month land and sea breezes begin.

March.

Throughout this month regular land and sea breezes prevail. The current, although generally S. S. W., is variable at times, setting from different quarters, one hour in one direction, another probably in the opposite. March is one of the finest months at the Little Basses, the thermometer often reaching 87° in the shade. The land and sea breezes being regular and the current weak, the passage up or down the coast is easy in this month.

April.

The winds are variable during the month, being sometimes from N. E. at others from S. W., blowing from the latter quarter for days together. Sometimes, in the course, of a day, the light vessel's head will be at almost every point of the compass, weather becomes gloomy with occasional showers, thunder and lightning prevaling with dense blackness over the land. As a rule very slight current is felt, but it occasionally runs strong to the S. S. W.

May.

Between the 1st and 20th of this month the S. W. monsoon sets in strong and steadily, generally much rain falls, and thunder and lightning are common. During seven years the S. W. monsoon set in regularly from the 4th to the 10th of May, and in 1869 it was steady at S. W. from April 6th. This year is accordingly an exception to the rule with regard to winds and currents. After May no rain falls until the 20th of October, and it is hardly an exaggeration to say that not a drop of rain falls during the S. W. monsoon. The current runs N. E. from one to three knots.

June, July, August, September.

Throughout these four months one day resembles another, the S. W. monsoon blowing strong and steadily generally, beginning about 10 A. M., by noon increasing to a gale, so continuing until 4 P. M., and then decreasing towards sunset; if the gale continues after sunset it moderates after 10 P. M., never attaining throughout the night aught beyond a strong breeze. There is a strong current setting N. N. E. from one to three knots. As soon as the sun passes southward of the line, the regular monsoon ceases on the south-coast of Ceylon and the wind becomes variable, land and sea breezes setting in with an intervening calm.

A remarkable circumstance occurs with regard to currents during the S. W. monsoon. After running three knots to the N. E. for ten days suddenly it slackens and runs from two to three and a-half knots S. W., or from the Bay of Bengal, lasting sometimes only one day, at other times for a week, these changes happening at all times of the moon and appear to obey no recognized law. By observing these changes in the current, monthly communication was kept up with extreme difficulty and much risk with Potana Bay and thence by land with Galle.

October.

During this month regular land and sea breezes prevail, the S. S. W. current running strong towards the end of the month, at times attaining a rate of five knots. The light vessel does not swing again until the middle of March, so that for five months and a-half the currents run steadily out of the Bay of Bengal with a velocity of from one to three and a-half knots and sometimes of five knots. In communicating with the shore on the 15th December the light vessel's boat was swept past Potana and could neither return to the ship nor land; but at length, when out of food and water, the coast was reached at Kirinde, where the boat remained until February 10th, before a return to the light vessel could be attempted.

November.

November, although rainy with thunder and lightning, is not a bad month at the Little Basses, as the N. E. monsoon, blowing strong and steadily, sets in towards the end. The S. S. W. current runs strong, invariably setting floating substances out to sea, which accounts for the fact of so few things coming on shore on the south coast of Ceylon.

December.

During this month a strong N. E. monsoon prevails and the current attains its greatest strength. The light vessel is uneasy and rolls violently. In December no ships should proceed to the northward along the S. E. coast of Ceylon. The period during which ships may proceed north is that intervening between February 15th and November 15th, and for three months in the year it should not be attempted.

Miller.

Captain Miller, through the pages of the *Nautical Magazine* in 1843, recommended the following rules for navigating the Bay of Bengal:—

From 1st January to 31st of May.

Going north up the Bay take the western side; coming south or out of it take the eastern side.

In June, July, and August.

Bound north keep in the middle of the Bay; coming south take the eastern side, even east of the Andamans.

In September, October and November.

Bound north take the eastern side; coming south take the western side.

December to the 15th January

Going either north or south keep in the middlle of the Bay and make short tacks.

Marshall.

In the early seventies, the palmy days of shipping on the Coromandel Coast, Captain Marshall, one of the latest writers on the Bay of Bengal, rendered valuable services to vessels trading up and down the Bay by classing the months with the prevailing winds and currents for each.

WINDS AND WEATHER ON THE COROMANDEL COAST.

The N. E. monsoon is considered the fine weather season on this coast. After it has once set in the temperature becomes cool and pleasant, the sky serene and clear, and the sea in the Bay smooth when compared with the S. W. monsoon. It generally commences in the middle of October, very frequently with cyclonic or stormy weather and heavy rain squalls, the prevailing winds being from N. N. E. to N. E., shifting a point or so to the westward when near the land. The month of October is a most uncertain month, although light variable winds from W. to N. W. and fine weather frequently prevail until the 25th or 26th of that month. The mariner navigating the Bay at this season should always be in a state of complete preparedness, carefully watching the barometer for any indication of a rising wind and sea, as a low and falling barometer with dark gloomy weather may safely be considered the precursor of a cyclonic storm. At the head of the Bay, more particularly at the Sandheads, the general direction of the N. E. monsoon is at north or varying from N to N. N. E; but on the coasts of Orissa and Coromandel it is inclined more easterly.

November and December.

The prevailing winds during these two months blow from N. N. E. to N. E., shifting a point or so either way when near the shore at night and blowing strong and steady. The weather is generally settled in these months, more so in December than in November, which occasiondly brings very unsettled weather, and cyclones occur frequently in November and even early in December; so that the vigilance and caution recommended to be maintained in the month of October should not be relaxed in either of these months, more especially in November. The currents in the Bay of Bengal usually run with the wind, and in these months it may be expected to set to the S. W. and S. with considerable force.

January and February.

The winds in the former month are generally from N. E. to E. N. E., veering occasionally to E. They are steady and blow fresh to the northward of the 13th degree of latitude; but towards the head of the Bay land and sea breezes often prevail at the middle and latter end of this month, and even southerly winds have been experienced. In February the N. E. monsoon abates considerably, and ceases entirely on the coast to the northward about the middle of this month, the winds gradually veering to the E. S. E., S. E. and south. The current in the beginning of January continues to run on the coast to the S. W. and S. and abates at the latter end of the month. In the first part of February there is little or no current on the coast, but before the expiration of this month it begins to set to the N. and N. E. In the Bay the current sets strong to the southward both in January and February.

March and April.

In the northern portion of the Bay the winds during the day are strong from S. S. E. to S. S. W. They decrease at sunset, and are succeeded by land winds from S. W. to W. N. W. The land winds on this coast are not so strong or steady as on the western coast, and a vessel intending to benefit by them should be well into the land, for they do not extend to any distance seaward. Squalls from the N. W. are to be looked for in the month of April. The current in both these months runs with great strength to the N and N. E. along the shore, according to the configuration of the coast. Along the southern part of the Coromandel Coast the "longshore" winds blow very fresh throughout these months from S. S. E. to S. W., and sailing vessels making a port should guard against a strong current to the northward from the northern coast of Ceylon as far as Point Divy.

May.

The prevailing winds in May are from S. to S. W., veering towards the land at night and abating in strength. In this month N. W. squalls blow off the land with great violence, and they generally occur in the early part of the night. Cyclones frequently visit the Coromandel Coast in this month and the barometer should be carefully watched, as any sign of depression with a shift of wind to the N. W. and N. may be safely taken to indicate the approach of a cyclone.

June, July, and August.

The S. W. monsoon generally sets in on the Malabar Coast in the fag end of May, and it blows with full force throughout these months all over the Bay of Bengal, prnicipally from W. to W. S. W., with much rain and an overcast sky, for several days together, rendering it difficult to obtain observations. Along the coast, particularly in the southern part of the Bay, the land winds blow with great velocity from W to W. S. W. for several days at a time, with occasional rain squalls, without a shift of any kind to seaward.

The current on the coast extending to the bank of sounding runs strong in June, July and August in the direction opposite to the wind. This current is at times very strong, and some rapid passages have been made from the northern to the southern ports, when vessels have to beat down against the monsoon, keeping well in shore.

September and October.

The winds during the whole of September are from W. S. W. to west and N. W. on the coast with occasional sea breezes. In the Bay the S. W. monsoon moderates and the weather is much finer. The month of October generally sets in with light variable winds and calms with sultry weather until the middle of the month, when the N. E. monsoon is ushered in first in the northern parts of the Bay, sometimes middling and sometimes with strong winds, heavy rain and dark cloudy weather.

GENERAL INFORMATION FOR WORKING DOWN THE BAY ON THE WEST SIDE.

There is little or no trouble in working up the Bay in the N. E. monsoon as the weather is clear, the difficulty being with the S. W. monsoon. The old masters in the country service, after leaving the Sandheads late in May or early in June, usually make for the Orissa Coast, sighting it south of False Point, beating down close in shore, and making short tacks out to sea during the day and long ones out during the night. If this can be continued until Santifully Hill is sighted, so much the better; if not, abreast of Calingapatam beat no more, but stand down the Bay with occasional shifts of wind to the westward of S. W., when Acheen Head will be cleared. In beating on the bank of soundings, the vessel is assisted by the current setting against the wind and by the fierce N. W. squalls off the land.

At this season, when a vessel may run south for four or five hours, these squalls are not to be trusted, as they commence to make reduced sail without delay. Many strangers have been caught and their sails reduced to rags in a few minutes. My experience of this S. W. current in September is here given.

On the 1st of the month bound up the Bay and sighted False Point light at 10 P.M., which dipped at 2 A.M., expecting to sight the Pilot's Ridge light before daylight. As the light was not seen when expected, hove the log and found the ship making five knots with yards nearly square and an exceptionally fast ship. Continued until 8 A.M., when the sounding was a few fathoms beyond the depth for sighting the Ridge light. Hauled up about five points, and placed a lookout on the masthead. At noon had no observation, and it was only at 12-30 P.M. that the light vessel was reported from the masthead. She was passed at 4-30 P.M. Vessels beating down with such a strong current in their favour would make a good day's work.

Sir Lancelot's passage down the Bay in July.

Left Sandheads 4th July. On the two previous days a cyclone passed up the Bay. Storm signals were up on all the stations along the river and had to anchor. When the pilot left the wind was light from S. S. W., stood to the S. E. until next day. The wind then veered to S. E., then E., and stood away to the westward. On the 7th sighted the high mountains off Ganjam, ran into the S. W. monsoon at 2 P.M. with hard squalls and rain, and on the 15th was out of the Bay, 110 miles clear off Acheen Head. I stood away again to the W. N. W. for 48 hours to make westing, so that when going south on the next tack, I will be far enough from the coast of Sumatra to avoid the belt of calms along that coast. With occasional veering winds crossed the Equator in 90° E. and picked up the S. W. wind in 8° S.

Calms off Sumatra.

After beating down the Bay in a strong S. W. monsoon, the next worry for the ship master is calms on this coast, which often cause a delay of two to three weeks, and I have known it to be more. I do not recommend the near approach to Sumatra when south of the Great Nicobar or even west of Acheen. If a tack was made to the W. N. W. for 200 or 300 miles, as the wind may permit, the next tack to the S. S. E. may allow a vessel to cross the Equator in about 90° E. clear of the calm belt, and in all probability make a better passage from the Sandheads to the equator than she would have made had she continued making a S. S. E. or a more easterly course after clearing Acheen. (*See map for "Sir Lancelot's" track.*)

PORT COMMISSIONER'S NOTES FOR CAPTAINS OF VESSELS ARRIVING AT THE SANDHEADS.

Note.—No dependence can be placed in finding two brigs on the station.

Distinguishing Signals used by the Pilot Brigs.—A red flag hoisted at the main is intended to inform captains of inward bound vessels that she will supply him with a pilot, and should be made for without hesitation irrespective of the other brig.

At night the supply brig endeavours to attract the attention of inward bound vessels by burning maroons at short intervals between the Admiralty 15-minutes regulation.

The buoy brig, *i.e.*, the brig that takes out the pilot from outward bound vessels, hoists a white flag at the fore. Should the captain of an inward bound vessel, on arrival at the Sandheads, find neither of the pilot brigs with the red flag flying at the main, he may conclude that there are no pilots on the station, and should pay particular attention to any signals that may be made to him.

The captain of an inward bound steam vessel should, when within signalling distance, indicate her gross tonnage to the commander of the pilot brig, as he cannot supply him with a pilot until this information has been given. Sailing vessels should show net tonnage.

Steamers on closing the pilot brig should lay-to under her stern or weather quarter, and, after the pilot is on board, tow the boat to windward of the brig.

Sailing vessels should invariably lay-to on the same tack as the pilot brig unless signalled to the contrary.

Cruising Station of Pilot Brigs.—During the S. W. monsoon they endeavour to cruise 7 to 8 miles S. to S. W. of the Eastern Channel's light vessel, the supply brig as a rule taking the outer position.

During the N. E. monsoon they cruise or anchor 4 to 5 miles from W. to N. N. W. of the same light vessel.

Vessels arriving at the Sandheads and finding the supply pilot brig at anchor should exercise the utmost caution in closing her on account of the strong tides.

When easterly winds prevail there is a strong set to the westward, it being then specially incumbent on strangers to take advice given from the brig.

Vessels coming in at night should never heave-to to windward if they intend to take a pilot before daylight, but close with the brig as soon as possible.

The brig should be approached round the stern, whether at anchor or under way. In the months of August, September, and October, when vessels are signalled to keep to windward owing to there being no pilots or other cause, they should be careful to keep the Floating light vessel or brigs well in sight; for should the wind fall light, they are liable to be set out to sea, and particularly in the two latter months may not be able to return for many days. This is a matter which requires particular attention.

The lead should be used frequently after getting on soundings.

Signals from the brig "to prepare for bad weather" should not be ignored. Strangers working in should study the tide: the first of the flood setting to the westward stand to the eastward; the first of the ebb setting to the eastward stand to the westward and northward. A kedge anchor is useful in light winds and calms when on soundings.

Strangers anchoring below the light-ship, or at any distance off her or the brigs, should endeavour to get to the latter and not remain at anchor.

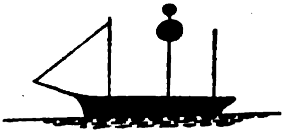
This applies to both monsoons. The practice of sailing vessels rounding the brig close to with much way on in a sea-way is dangerous both to the latter and to the boat alongside. It almost swamps the boat, and the ship, on being brought to the wind, gets a rapid stern board on to the brig, which has often great difficulty in getting clear.

HOOGHLY RIVER APPROACHES.

FLOATING LIGHT VESSELS.

ALL BEARINGS ARE MAGNETIC.

LONG SAND.



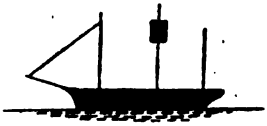
Lat. 21° 36′ 26″ N., Long. 87° 59′ 30″ E.

Long Sand is stationed in Saugor Roads with Saugor Light-house bearing N. E., distance 3½ miles, and the Long Sand Spit buoy S. 75° W., distance $\frac{1}{10}$th of a mile in 22 feet of water.

Day.—Carries a small black ball over a larger one, the hull painted red, and "Long Sand" painted in white letters on her side.

Night.—Displays a fixed white light 21 feet above the water, visible in clear weather 9 miles, and a riding light 6 feet above the rail.

UPPER GASPAR.



Lat. 21° 31′ 0″ N., Long. 88° 2′ 2″ E.

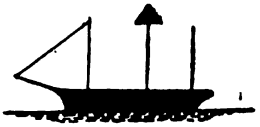
Upper Gaspar is stationed in the Gaspar Channel in 20 feet of water with Saugor Light-house bearing N. ¼ W., distance 7¾ miles, and Centre Eastern Gaspar buoy, east, 2¾ miles.

Day.—Carries a black drum at mainmast-head, the hull painted red, and name of station painted in white letters on the side.

Night.—Displays a fixed white light 48 feet above the water, visible in clear weather 12 miles, also carries a riding light on the fore-stay 6 feet above the rail.

During fogs fires a gun every first and third quarter of the hour.

LOWER GASPAR.



Lat. 21° 25′ 53″ N., Long. 88° 7′ 0″ E.

Lower Gaspar is stationed in the Gaspar Channel in 28 feet of water with station buoy S. 70° W., distance 0·7 mile ; Upper Saugor Sand buoy S. 66° E., distance 2 miles.

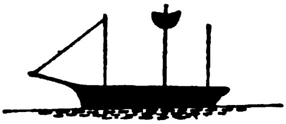
Day.—Carries a black cone at mainmast-head, the hull painted red, and name of station painted in white letters on the side.

Night.—Displays a fixed white light 48 feet above the water, visible in clear weather 12 miles, carrying a riding light on the fore-stay 6 feet above the rail; also burns a blue light at the half-hour.

During the time the Intermediate light-vessel is not on her station (*i.e.*, from 1st December to 31st January), this light-ship will, from sunset to sunrise, burn a blue light at the hour in addition to the one burnt at the half-hour.

During fogs fires a gun at the hour and half-hour. The two Gaspar lights now bear from each other N. S. 46° W. E., distance 6·9 miles.

INTERMEDIATE.



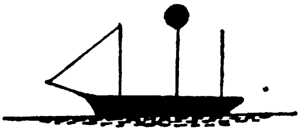
Lat. 21° 13′ 45″ N., Long. 88° 11′ 0″ E.

The Intermediate light-vessel is placed in position from the 1st February to 30th November (inclusive), and is stationed about half-way between the Lower Gaspar and Eastern Channel light-vessels in 42 feet of water with the Wreck buoy north, distance three-quarters of a mile, Bell buoy N. 40° W., distance 5½ miles, and Centre Saugor Sand buoy north, distance 5 miles.

Day.—Carries a black half-ball at the mainmast-head with the spherical side downwards, the hull painted red, and name of station painted in white letters on the side.

Night.—Displays a fixed white light 48 feet above the water, visible in clear weather 12 miles; also carries a riding light on the fore-stay 6 feet above the rail.

EASTERN CHANNEL.



Lat. 21° 0′ 30″ N., Long. 88° 12′ 0″ E.

The Eastern Channel is stationed at entrance to Eastern Channel in 60 feet of water, with Station buoy north, distance 1½ miles, and Lower Reef buoy N. 40° W., distance 6½ miles.

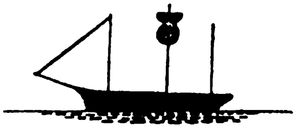
Day.—Carries a black ball at main, the hull painted red, and name of station painted in white letters on the side.

Night.—Displays a single flashing white light in periods of thirty seconds, the duration of each flash being about five seconds, and the dark interval about twenty-five seconds.

Visible in clear weather 12 miles; also carries a riding light on the fore-stay 6 feet above the rail.

During the S. W. monsoon, or from 15th March to 31st October, a blue light will be burnt every half-hour between 7 P.M. and 5 A.M. During the N. E. monsoon, or from 1st November to 14th March, a blue light will be burnt every hour between 7 P.M. and 5 A.M.

PILOTS' RIDGE.



Lat. 20° 51′ 30″ N., Long. 87° 52′ 0″ E.

Pilots' Ridge is placed in position from the 15th March to the 31st October (inclusive), and is stationed just eastward of the Pilots' Ridge in 26½ fathoms of water with the station buoy bearing north, distance 1 mile.

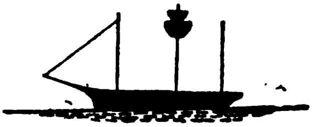
Day.—Carries a black ball and half-ball at the mainmast-head, the hull painted red, and name of station painted in white letters on her side.

Night.—Displays a single flashing white light in periods of sixty seconds, the duration of each flash being about ten seconds, and of the dark intervals fifty seconds.

Visible in clear weather 12 miles; also carrying a riding light on the fore-stay 6 feet above the rail.

This light will only be shown from the 15th March to the 31st October inclusive. A blue light will be burnt every hour between 7 P.M. and 5 A.M.

MUTLAH.



Lat. 20° 57′ 0″ N., Long. 88° 34′ 0″ E.

Mutlah is stationed off entrance to the Hooghly river in 17 fathoms, mud bottom, and with the station buoy bearing N., distance 1 mile.

Day.—Carries a black half-ball surmounted by a black cone on the main mast-head, the hull painted red, and name of station painted in white letters on side.

Night.—Displays a double flashing white light in periods of thirty seconds, the duration of each of the two flashes being about two and a-half seconds; of the intermediate eclipse about two and a-half seconds, and of the long eclipse about twenty-two and a-half seconds.

Visible in clear weather 12 miles; also carries a riding light on the fore-stay 6 feet above the rail.

Note.—Light vessels out of position at night show a fixed red light at bow and stern, a red flare every quarter of an hour, the station light being put out. If in danger fire rockets by day distinguishing mark struck.

All light vessels during fogs will ring a bell at not more than 2 minutes interval.

CHANDIPORE FLAGSTAFF LIGHT.

Lat. 21° 27′ 0″ N., Long. 87° 1′ 45″ E.

Chandipore Flagstaff is exhibited from the Chandipore flagstaff, situated on the Balasore Coast at the entrance of the Balasore river. It is a white dioptric light of the sixth order, showing over an arc of 10 points between the bearings of W. by S. through W. to N. by E., visible 10 miles. The height of the light above high water is 52 feet.

SHORTT'S ISLAND LIGHT-HOUSE.

Lat. 20° 46′ 54″ N., Long. 87° 4′ 18″ E.

Shortt's Island Light-house is situated on the highest part and centre of Shortt's Island, being 6 miles to seaward of the entrance of the Dhamra river, and 8 miles from the outer edge of the Palmyras shoals.

It is a dioptric light of the third order, with alternate flashes and total eclipses, being visible 14 miles. An independent fixed light is shown from an opening on the west side of the tower at a height of 41 feet above high water, which shows a narrow green and red sector separated by a white ray, defining the fair-way channel into the river. This subsidiary light is not visible except when to westward or in shore of the light-house. The light is exhibited from a masonry tower of red stone, which is 70 feet from base to vane, the centre of the light being 80 feet above mean sea level.

FALSE POINT LIGHT-HOUSE.

Lat. 20° 20′ 20″ N., Long. 86° 44′ 00″ E.

False Point Light-house is situated at the entrance of the river Mahanuddy, about 1½ miles west of Mahanuddy Point and 1⅓ miles from the sea.

It is an occulting white dioptric light of the first order, obscured four seconds once in every half-minute, illuminating an arc of 200°, *viz.*, from S. S. W. through W. and N. to N. E. ¾ N., and standing 127 feet above the level of the sea, and is visible in clear weather 19 miles.

The light-house is built of laterite stone and is painted red, with a large white ten-pointed star facing to the south-east.

Vessels can communicate with Calcutta by telegraph from this light-house by hoisting the usual flag signals.

REFUGE HOUSE.

The following are the Port Commissioner's Instructions to wrecked seamen and others who may reach this Refuge House in distress:—Provisions, water, clothing and certain other stores, as per list marginally noted, have been placed in each refuge house for the use of shipwrecked people. It is requested that the greatest economy be observed in the use of them; and that in case of all the stores in this House not being required, whatever may be left be packed and carefully covered up again. It frequently happens that the stores in the Houses of Refuge are robbed by wood-cutters and boatmen, so be most careful with what provisions you take with you if journeying from one Refuge House to another.

List of stores supplied to each Refuge House.

1 cwt. of biscuits in four sealed tins.
8 flannel shirts.
8 cloth trousers.
8 country blankets.
8 pairs canvas shoes.
8 sun hats.
1 tin pot.
1 tin lantern.
1 lb. candles.
2 lbs. nails.
1 cold chisel.
1 hammer.
1 gimlet.
1 flint steel and sola for tinder.
2 boxes of matches in tin boxes.
15 feet of canvas hose.
12 tins of soups (1 lb. tins).
1 axe.
20 fathoms 1½ coir rope.
1 punt.
2 paddles.
2 bamboos.
1 Chart in tin case, with tight-fitting lid; also a set of instructions in English, French, and native languages, and 100 gallons of water in tanks. Refuge Houses Nos. 2 and 5 have 2 punts and 2 sets of paddles.

The party should be kept together and no one allowed to stray, as tigers are numerous. Make a fire as a signal of distress with the driftwood generally to be found all along the sea face and banks of the rivers. After cyclones and heavy gales a steamer is despatched to visit the Refuge Houses; therefore, under such circumstances, unless you have boats, it will be advisable to remain by the refuge until assistance arrives; but in cases where vessels have been lost in ordinary weather of either monsoons, it will be advisable to send notice to Mud Point, Saugor Island, or Port Canning, or to vessels entering the river (as may seem best), by the punt with which each House is provided, if no better mode of conveyance is at hand. The chart will indicate the route to be observed.

Should you decide to leave the house keep together and follow as much as possible the large creeks or sea beach, going from one House to another if necessary, until you come to Channel Creek (if going to the westward) where there are villages on Saugor Island. To the eastward villages will be found above the catlake, on the river Mutlah, if you decide on proceeding to Canning Town.

On your road break the branches of trees (allowing them to hang) to indicate to those who may be in search of you the direction you are going in. If travelling to the north, break the branches on the north side of the trees; if to the west those on the west side, &c. Be careful to do this at all points and at the entrance of creeks that you may pass. Carry fire with you, as it will be useful in many ways, and enable you to make signal fires at all stopping places as you go along.

The rope placed amongst the stores is intended to assist in making a raft or for tracking purposes. Driftwood in large quantities is often found, and among it may sometimes be found material for forming a raft if required.

In case the provisions have been stolen the hearts of the young palm trees, which grow in great numbers, will be found edible. The scurvy grass or samphire which grows in great quantities is also edible when cooked. An oyster bed exists in the creek on the opposite bank of the river to that on which No. 4 Refuge House is situated, but search must be made for the oysters at low water. They are to be found sticking out of the mud in the bed of the creek. They are somewhat coarse flavoured but very nutritious, and though oysters have only been actually met with in this one creek, there is not the slightest doubt that they are to be found in many others. Water can be procured at No. 1 house by digging down a few feet on the higher parts of the land, and there is every probability of water being found in many parts of the Sunderbunds at short distances from the sea, particularly on the higher lands, such as the west sides of Bulcherry and Bagandoony Islands, &c. A shoot has been attached to the roof of the house for the purpose of catching water, and the hose supplied among the stores is intended to enable you to save water when it rains and refill the tank before leaving the house.

RICE PORTS.

Orissa Rice Port.

The Rice Ports on this coast that are visited by sailing ships yearly to load for Mauritius are Pooree, False Point, and Balasore. These ports are only considered safe in certain months, with the exception of False Point. The S. W. monsoon blows direct into the others, causing a heavy surf on the beach. Vessels coming to any of these ports to load must be very careful to have a plentiful supply of stores and water for the round voyage, dunnage wood, mats, &c. Supplies are hard to obtain, every article being expensive, as they have to be ordered from Calcutta or Cuttack.

When bound to False Point, one need not be surprised to find beacons and buoys out of position. This port is visited yearly by cyclones, and the appearance of Reddie Point is continually being changed. On my last voyage there were no tripod on the point, and the appearance was completely altered. I knew what had occurred and took the necessary precautions.

All bearings Magnetic.

False Point Harbour is formed by Dowdeswell Island, extending in a N. W. direction, extreme northerly point 7 miles N. N. E. of the light-house.

Reddie Head has been re-formed since the cyclone of 1885, Hookey Tollah having been washed away, there is now a fine Refuge House and some cocoanut trees left standing.

The new Refuge House is a large stone building, easily distinguished from seaward, and on a hazy day I have picked it up before the light-house.

From December to March fog and mist occasionally rise over the land and interfere with the brilliancy of the light, and at times may even obscure it, although the weather at sea may be clear. Vessels from the southward bound to False Point in the S. W. monsoon, on approaching the light-house, should not shoal under 10 fathoms. When the light bears N. W. alter course to N. N. E. until the tripod on Dowdeswell Island bears N. W. ½ W. Thence a N. W. by N. course for about 3½ miles will place a vessel in 6½ fathoms, mud about one mile from the shore, with the tripod bearing to the southward of west. Stand in until Temple Tree and the Jumboo buildings are well open to the northward of Dowdeswell Island and anchor as convenient.

Buoys.—Fairway buoy, black and white horizontal, lies in 4½ fathoms lowest spring tides, with Temple Tree bearing W. S. W. and Hookey Tollah flagstaff S. ¼ W., distant $2\frac{9}{10}$ miles.

Outer western buoy, red with staff and cone, lies in 20 feet N. by W. ¼ W., $2\frac{3}{10}$ miles from Hookey Tollah flagstaff.

The position of these buoys are, however, liable to be changed from time to time as the sands extend into the channels.

POOREE.

The best anchorage is with the flagstaff bearing from W. ½ N. to W. ½ S. in not less than 6½ fathoms according to condition of weather, and the lead should be constantly used when approaching the anchorage, as the beach is very steep-to and the water shoals very rapidly, the holding ground being good with clay bottom.

The flagstaff bears S. 33° E. from the Jugannath pagoda.

BALASORE.

This port is the worst of the three, as the town is about 30 miles from the ship. The latest report to hand is from Mr. T. Sullivan, late chief mate, barque "Inversnaid," at Balasore from February 1st to March 12th 1897.

Anchored in 6 fathoms of water with the flagstaff and buoy in one bearing N. W., buoy distant about 2 miles; discharged ballast and commenced to load cargo of rice for Mauritius. The weather being very unfavourable for loading, most of the time having strong southerly winds and much rain, sometimes the wind blowing from S. W. and at times S. S. E. with a strong gale, the ship riding with one anchor and 60 fathoms of chain on several occasions having to drop the second anchor. I noticed that during a strong blow the flood tide ran up longer than usual, and after the gale was over the ebb ran back the same, making the water very low. At low water, where I was anchored in 6 fathoms at high ordinary tides, I had a fall of about 5 feet. On one occasion I had to let go the second anchor and pay out 105 fathoms on the first and 60 fathoms on the second anchor. I then sounded and found I had only 4 fathoms, a heavy sea running in with a heavy gale from S. S. E., the ship taking seas over both rails. I could see the shallow patches all around. I waited till the wind went down, hove one anchor up and hove short on the other, and with the assistance of the cargo people, got under weigh and worked out to 7½ fathoms and came to buoy and flagstaff on the same bearing, buoy then being distant about 4 miles. When the weather grew fine I took the boat and sounded. I found the soundings very uneven, caused, I believe, by vessels discharging ballast all over the buoy, and especially in the vicinity of what they term the anchorage buoy. A short distance from where I was at anchor I found 5 fathoms. I have been informed that a barque grounded in a hillock after loading was completed, although they thought it to be a safe position.

No vessel should anchor closer than 3½ or 4 miles off the buoy, flagstaff and buoy in one, and even then it would be advisable to sound all around with the boat. In making Balasore keep the light on a N. W. bearing and the lead going, the light being visible about 10 or 11 miles in fair weather. There is no light-house, only a lamp being hung up on the flagstaff. When you make the light and obtain a cast of 7 fathoms, it is advisable to anchor till daylight. After discharging ballast a vessel can always shift in or out with the flood or ebb, which runs at the rate of three to four knots per hour. The sea gets up very quick, but the holding ground is good.

Master on shore on ship's business during the shifting.

Coromandel Coast.

Cocanada is the only port on this coast north of Madras now visited by foreign sailing vessels. It has a fine large bay, well protected by a reef running up from Hope Island. Ship can anchor anywhere on the regulation bearing in 5 fathoms of water, the holding ground being good. I have ridden out many monsoon changes with single anchor and 75 fathoms of chain. Although vessels anchor 7 miles from the town, bazaars are usually on board early, supplies being plentiful and prices moderate. Cocanada is now connected by rail with other parts of India. In making this port in the N. E. monsoon care should be taken to make the coast 30 miles north of it and 30 to 40 miles south from the time southerly winds set in until the end of the S. W. monsoon.

Currents.

The current runs with great velocity along this coast, due to the waters of the Godavery, and it affects steamers as well as sailing ships when not guarded against. On one occasion, about the middle of September, the Norwegian steamer "August," from Masulipatam Bay, was due at Cocanada at 6 A. M., but she did not arrive until 7 P. M. This was due to the master, a stranger to the coast, sighting Hope Island light at 10 o'clock the previous night, and slowed down to wait daylight. He shortly after lost sight of the light but did not know of the rapid rate the current was taking his steamer off the coast. At dawn he went full speed, and continued so until he anchored at the time mentioned above, her speed being eight and a-half knots per hour. I left the port within a week, bound south and had to beat out at 4 P.M. A N. W. squall assisted me to get off the coast about 12 miles, with Hope Island Light-house bearing W. N. W. It then fell a dead calm, and continued so until the next afternoon. Throughout the night the ship headed W. N. W. on to the land and kept so, the helm being entirely useless to move her head one way or the other, and the noise the current made was similar to that of the overfalls usually met with in the middle of the Bay. I had the anchor ready for letting go; but I knew by the run of the coast she would drift clear of danger. The position at noon on the following day by observation placed the vessel 83 miles distant from where the wind left her, and this on a S. S. W. course made good.

Current setting North.

Again, when the current is setting north, I have frequently sailed from Cocanada early in the afternoon and headed S. S. E. with a good three knots breeze, next morning being in sight of the high range of mountains of Vizagapatam. It is a custom of mine that, when bound to Cocanada from the latter part of March to early in June, and again when the monsoon moderates in August or September, if I cannot make the port before dark, I anchor south of Sacramento Shoal and start early next morning.

Sacramento Shoal.

This dangerous shoal lies abreast of the mouth of Kotapalem river and 16 miles S. by W. ¼ W. of Godavery Point, several coasting steamers having grounded on it. In June 1867 the American frigate "Sacramento" was lost here; and in May 1894 the steamer "Lanark," with railway materials for Cocanada, was lost on in the same shoal. The accident is said to be due to an unusual S. W. current at 1·8 knots per hour under the following circumstances:—The master ascertained his position at noon on the 31st May to be Lat. 15° 31′ N., Long. 82° 41′ E., and had found, by comparison with the dead reckoning, a difference (assumed as current) to the N. E. of some 6 or 7 miles; and from this position steered a course to make N. 10° W. (true) to strike 5¾ miles east of Hope Island light, then distant 84 feet, but at 4-30 P.M. he hauled out N. 40° W. (true), patent log registered 42¾′; the observations since noon showing a set to the eastward, continued steering N. 40° W. until 7-20 P.M., and then N. 20½° W. (true) until 8-15 P.M., when engines were stopped for soundings, but no bottom was found at 36 fathoms, and again at 8-35 P. M. no bottom with 60 fathoms. Finally, at 9-15 P.M., the ship stranded on the Sacramento Shoal, where she remained in spite of all efforts to free her by working the engines ahead and stern, which only resulted in choking the machinery with sand. The engines were stopped and ballast banks run up to steady the vessel and prevent her driving up the shoal. The heavy seas breaking clean over her she thumped heavily, broke off the rudder, and smashed the boats to starboard. When nothing could be done to save her she was abandoned and the crew taken off by a passing steamer.

"Barque Grosvenor."

In April 1895 the barque "Grosvenor," from Colombo to Cocanada, to load for Mauritius, grounded close to the "Lanark" at 3 in the morning. She went on at low water, being in ballast. As the tide made she floated and came on to Cocanada without any damage.

In July of the same year an Austrian steamer was lost on the shoal. A red light elevated 25 feet above high water, visible 8 miles, is now exhibited near Kotapalem beacon in Lat. 16° 35½′ N., Long. 82° 17′ E. westward of the Sacramento Shoal.

Directions for entering the port of Cocanada by Captain Gillham, late Master Attendant.

Vessels from the southward during the S. W. monsoon should not pass Godavery Point under 12 fathoms. On approaching Point Godavery at night from the southward great care is necessary and the lead should be briskly kept going. When the light on Hope Island bears S. W. ¼ S. in 12 fathoms, a N. N. W. to N. by W. ½ W. course should be steered until the Valkilipudi light, which will be in sight, bears W. N. W. The buoys which formerly marked Point Godavery have been removed and a large red buoy has now been placed to the north of Point Godavery in 6½ fathoms low water. The following are bearings taken from the buoy.

Hope Island Light-house S. by W. ¾ W.; Vakilipudi Light-house N. W. by W.—Vessels rounding Point Godavery should not pass nearer than half-a-mile to the northword and eastward of this buoy by day, or come under 12 fathoms by night till the Vakilipudi flash light bears W. N. W. She may then run in on this bearing until the light on Hope Island is brought to bear about S. ½ E. and anchor in 5½ fathoms. When abreast of the buoy, the outer shipping or anchorage will bear about N. W. by W. Running in for the anchorage by day after passing the buoy as before directed, a vessel should not steer a direct course unless the wind is from the southward and westward, as the flood tides set strong to the S. W., but, when nearly abreast of it to the northward, gradually edge in and anchor in 4 or 4½ fathoms low water in the S. W. monsoon, and in 5 to 5½ fathoms low water in the N. E. monsoon with the following bearings:—Light-house on Hope Island S. ¼ E. to S. ½ E.; the Vakilipudi Light-house N. W. by W. to W. N. W., soft bottom. Very little deviation from these bearings will take a vessel into shallow water to the south-east of the anchorage.

When vessels are working into the anchorage in the S. W. monsoon to the northward and westward of the buoy, they should not stand further to the south than 6½ fathoms low water, or bring the buoy to bear to the eastward of S. E. The lead should be constantly going, as the water shoals very rapidly when standing into the Coringa Bay. The lead is the best guide while beating in.

When coming into the port from the northward during the N. E. monsoon, the anchorage should be approached at night with the Vakilipudi light bearing W. S. W., then anchoring with the bearings already given and in the depth indicated for this monsoon; but it would be prudent for commanders of vessels bound to the port of Cocanada to anchor at night in about 10 fathoms until daylight, when they can run in and select a convenient berth with the proper bearings.

These directions are in supersession of all previous directions given for making the anchorage of Cocanada.

Vakilipudi Light-house.

The Vakilipudi Light-house is situated in Lat. 17° 0′ 40″ N., Long. 82° 16′ 30″ E., 4·6 nautical miles N. by E. ⅞ E. from the old light-house at Cocanada. It is a white tower 76 feet high from base to vane, and is intended to lead vessels clear of the shoals to the north of Point Godavery, when making for the Cocanada anchorage from the southward and eastward. The light is a white revolving light of the fourth order, flashing at intervals of 20 seconds and elevated 80 feet above high water, and should be visible from a distance of 14 miles in every direction seaward.

Caution.

It should always be remembered that the port buoys are liable to shift and break adrift suddenly, and the state of the weather may not permit to have them re-moored in position so promptly as could be desired. Commanders should, therefore, be on their guard and at all times be guided by the soundings.

Tides.

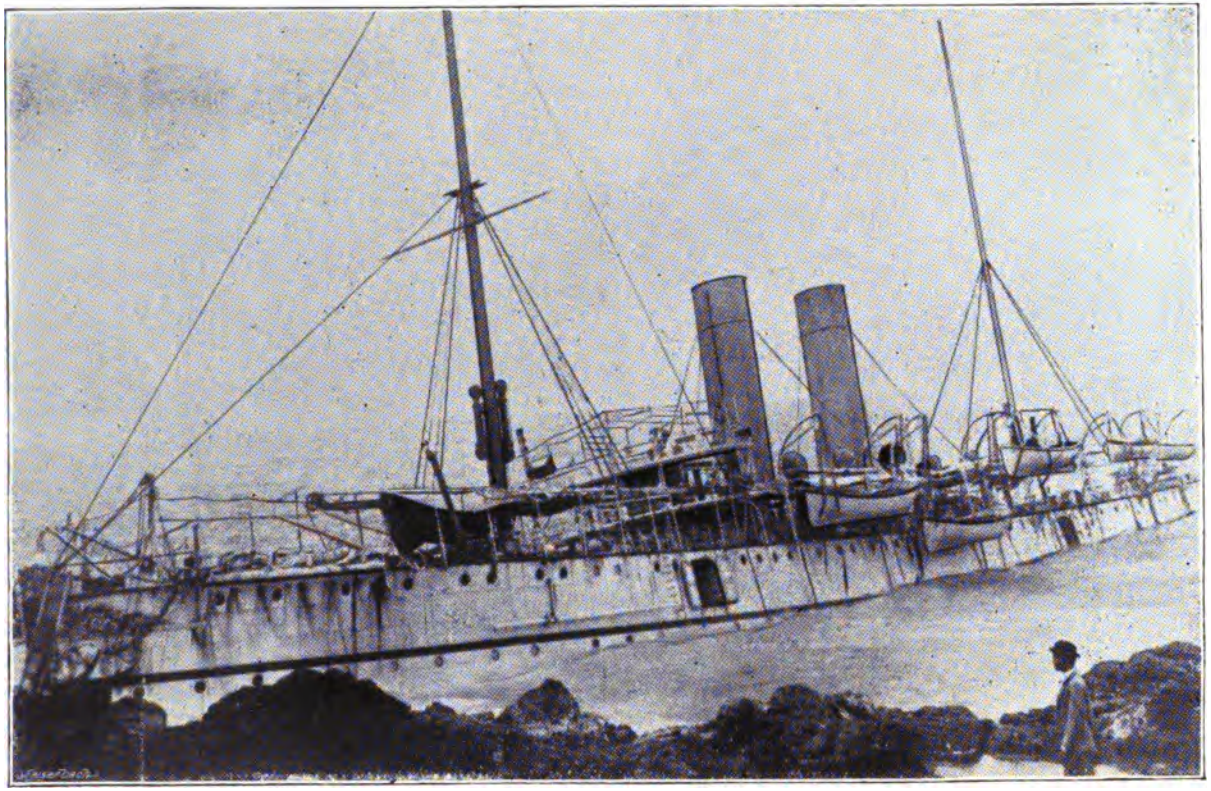
High water at full and change of the moon occurs at 9h. 15m. During the N. E. monsoon, when blowing strong from the N. E. or east, the spring tides rise about a foot or more higher. During the inundation of November 1839, the storm wave which swept over the town of Coringa rose to the height of 8 feet in the streets of that town ; springs rising 5 feet, neaps 3 feet.

Signals.

The Master Attendant's flagstaff is situated in close proximity to his office and is visible from the anchorage, but owing to the great distance off shore at which the ships anchor signals are not always clearly distinguished, especially in hazy weather.

Ballast Ground.

Commanders should on no account throw ballast of any kind out of their vessels under a depth of not less than 12 English fathoms low water, or they will incur a penalty under the conservancy Act.



R.I.M. TRANSPORT "WARREN HASTINGS."

ASHORE AT ST. PHILLIPE, REUNION ISLAND.

CHAPTER IX.

REMARKS ON THE CURRENTS OF THE SOUTHERN INDIAN OCEAN AND THEIR INFLUENCE ON VESSELS WHEN DISTURBED.

WHEN running across the trade winds bound out of the Bay of Bengal, westward of the Keeling Islands, steering to pass north or south of Rodrigues, drift currents are seldom taken into account until approaching the island. If the trade winds are strong and half-a-mile per hour is made over the estimate, most navigators will attribute this to the heave of the sea. But there can be no doubt that a current set across the Indian Ocean coming out of Sunda Strait and joining that of Keeling Cocos flow toward the islands and banks to the southward and westward, and are deflected and augmented on reaching them according to local influences, some of the various streams joining again in one great sheet of water west of Cape Amber, running with great velocity towards the African shore.

After the Java eruption in 1882 vast fields of pumice stones drifted south-westward and stranded on some of the islands, tons of it still lying on the south-east side of Rodrigues. The current that runs along the north and south sides of Rodrigues joins on its western side, and may be said to augment from this point, travelling on a westerly course towards Mauritius, and striking the coast somewhere between Flacq and the north of the island. It here appears to form two branches—one going north between the islands north of Mauritius with much force, the other following the coast towards Savane and Cape Brabant, strengthened on its way by the numerous tributary streams and rivers that flow into the sea. Augmented by the current from Grand River N. W., passes round Sandy Point and runs along the reefs until it reaches the confluence of the other currents from the east and south sides of Mauritius. It now travels on a south-westerly course from two to three knots per hour, according to the season of the year, and is supposed to pass St. Phillips and Réunion Islands on this course. It was this south-west current that the commander of the British transport "Warren Hastings" expected to have off Réunion, and which, in some unaccountable way, is said to have failed at a critical moment. The following account of the occurrence, condensed from the *Times of India*, may be of interest to those navigators who are strangers to the locality, and may warn them that in future they are not to approach too close to the shore :—

"The wreck of the 'Warren Hastings' will be permanently remembered as one of the most thrilling episodes in British maritime history. Soldiers and sailors alike showed, in an hour of terrible danger, a courage and devotion to duty which have called forth universal admiration. How nobly they stood the test imposed upon them the world knows, but it has been made equally clear by the evidence at the court-martial that the example of unflinching calmness was set by the commander. Upon him fell the task of directing the measures of saving the lives of 1,300 people, and it was chiefly due to his presence of mind that the disaster had such a happy termination. One circumstance exemplifies the readiness with which he grasped the situation. At the moment when the vessel struck the commander gave the order to reverse the engines ; but almost in the same instant he realised that his only hope lay in driving his ship further on the rocks. Promptly, therefore, he signalled "Full speed ahead," and the engines, aided by the swell, lodged the vessel upon a firmer resting-place. Had he not been quick to perceive the one course open to him the loss of life might have been great; for the manner in which the 'Warren Hastings' commenced to heel over two hours after she struck showed what her fate would have been if her commander had not forced her into a safer position." (*See illustration.*)

In his speech in his own defence the Commander suggested three possible causes of the catastrophe. The first was an abnormal deviation of currents. According to the Admiralty Sailing Directions, a vessel passing from the Cape to Mauritius might reckon on a strong south-westerly current. In deciding upon his course the commander reckoned upon this current. Unfortunately, owing, it is believed, to a distant cyclonic disturbance, the currents off Réunion were temporarily disturbed. Captain Bertho, captain of the port at Pointe des Galets Harbour, who is an unquestionable authority on the tides and currents off Réunion, being specially charged with observing them, gives emphatic testimony on this point. Writing three days after the wreck he stated: "For a month I have remarked at Port de la Pointe, with the exceptional weather we have had, a complete change in the currents." A similar statement was on the same day made by Lieutenant Barre, the officer in charge of St. Pierre.

Captain Bertho went further, for he asserted: "I confess that in his place, with my experience of the navigation of these ports, I should not have hesitated to believe in currents setting south-westerly. It was the misfortune of the 'Warren Hastings' to strike in the dead of night, a wholly novel northerly current due to *le temps anormal*. The commander can hardly be condemned for having placed implicit faith in the ordinary sailing directions. The next ground of his defence was the state of the atmosphere. It is beyond dispute that a sharp look out was kept. Three lookout men were stationed forward, and the commander was on the bridge with two lieutenants. They believed that they could see a mile ahead; yet the darkness was actually so intense that, after the vessel struck, the shore could not be described from the bridge. It may seem inexplicable that experienced navigators should have been so utterly deceived, but abnormal conditions are again available to clear up the mystery. Réunion boasts of a volcano, which was in active eruption at the time of the wreck. The volcano was discharging cindery lava, highly charged with water, which had produced heavy low-lying mists of vapour. The commander's explanation is that 'the steam and smoke from the volcano, being unable to escape upwards owing to the heavy rain, was forced down over the land and adjacent sea to a short distance above the sea, its lower edge forming a straight and clearly defined line parallel to the surface of the sea. In the darkness and with the heavy rain falling this appeared to us to be the horizon, indistinct but sufficiently marked to make us think we could see ahead all right. As to the second point of the defence, then, the existence of phenomena which could not have been anticipated is sufficiently established. The third ground upon which the commander claimed his acquittal was the probable effect of the volcano upon the ship's compass, and he was able to advance strong reasons in favour of his theory of deviation to these three causes, which could have been taken either separately or in conjunction, the loss of the 'Warren Hastings' was ascribed."

Phenomena on the ocean, and especially in these regions, are more numerous than the lay mind can conceive, as will be seen in various parts of this book by actual observations and apart from each other.

We are continually watching phenomena, it being the dread of the navigators life here from December to April. Piddington, a scientific navigator of the early part of the present century, left us a legacy in his circular theory of revolving storms, then little known or perhaps unknown, others following in his footsteps later. He and almost all followers of the circular theory of revolving storms have all passed away.

A new generation has arisen which knows not Piddington, and at the close of the century we find his name almost forgotten at sea and the spiral theory of cyclones confirmed, or nearly so. The wreck of the transport "Warren Hastings" off St. Phillipe has left us other theories to be solved, that is, the effect of cyclonic disturbances on currents and volcanoes on compasses. That this wreck will always remain a mystery is beyond doubt; but one feels confident that at no distant period, science will, when the vicinity of this or other volcanoes and cyclonic districts claim further victims, enlighten us on the cause. When passing a volcano in eruption due allowance may be made for the currents of the district when another enemy lay unsuspected in another direction. I am strongly of opinion that the influence of the Réunion volcano, when in eruption, extends further off the island than is at present known. Whether such influence travels by water or through space I have no means of knowing; but I do know that something unusual is on the move in these waters.

The "Warren Hastings" went on shore off St. Phillipe at 2-30 A.M. on the 14th January 1897. On the 12th I was running for Mauritius with moderate trade winds and fine weather. At 10-45 P.M. unusual phenomena occurred. I was in the chart room on the poop, partly asleep, when I became aware of a sharp rattling noise and a great commotion on deck. I immediately concluded that the ship must have struck some floating wreckage. Hastening on deck I found the crew in a panic and the officer on watch sounding the pump. From their report and the short duration of the shock I felt in the Chart Room it could not be otherwise than a tremor, as the wheel trembled in the helmsman's hands and the lookout reported that the cables rattled on the windlass. Had I been in the China or other seas where tremors are of frequent occurrence, I would have troubled no more about this; but as it is quite unusual in this ocean, I communicated the fact to the Director of the Observatory on my arrival, who replied that the volcano at Réunion now in eruption may have been the cause. If such was the case, how did the great power travel at such an immense distance from the scene of action? Is it by water or through space? Probably through space, and ships in the immediate vicinity of the eruption may have their compasses attracted by some magnetic substance thrown up from the bowels of the earth. The approximate position at the time the tremor was felt was Rodrigues and bore S. by E. 80 miles; distance from Réunion 430 miles.

The theory of a current setting to the north off St. Phillipe at the time of the "Warren Hastings'" disaster were freely discussed by nautical men, and I have heard it said that it was utterly impossible for currents to do so against the wind, knowing many instances where currents do set against the wind and with much force. Take the chart, and it will be seen that a cyclonic disturbance south of Réunion with wind at any point between S. E. and S. W. would in all probability cause the S. W. current to change its course northward and run up at any point between N. W. and N. E., and when the disturbance was over it would resume its usual course. Take as an example ships lying-to off the Cape of Good Hope, they having been found to set to windward against a heavy gale. Another instance is that of the Liverpool ship "Sierra Perima," wrecked on one of the Maldives Island in 1896. Her master, following the instructions of the current chart, allowed for an easterly current through the channel; he was navigating when the current was actually setting to the westward and drove his ship on to the reefs, where she became a total wreck. The following is a letter received from Captain Joshua Slocum when he visited Mauritius in the "Spray" in September 1897. It is quoted as I received it :—"In November 1884 ship 'Northern Light,' 250 miles S. E. of Mauritius, noticed one day a discrepancy in the longitude caused by currents of about 15 miles, and the following day 25 miles in the opposite direction (east), with considerable discrepancy now in the latitude as well. This went on, the error changing around from east to west to north and south, till on the fourth day the error in the ship's latitude was 84 miles north and on the fifth day 84 miles south, working thence to east and west, again ending as it began. I may mention that the weather was clear, and that three observers on the deck at noon had the same altitudes each for latitude. The ship was on a straight course all the time sailing before a steady trade wind. A heavy rolling swell from south accompanied this strange phenomenon. My impression at the time was that a submarine disturbance had occurred in the vicinity. Was it that, or was it the effect of some distant cyclone causing a whirlpool and which my ship was sailing through ?"

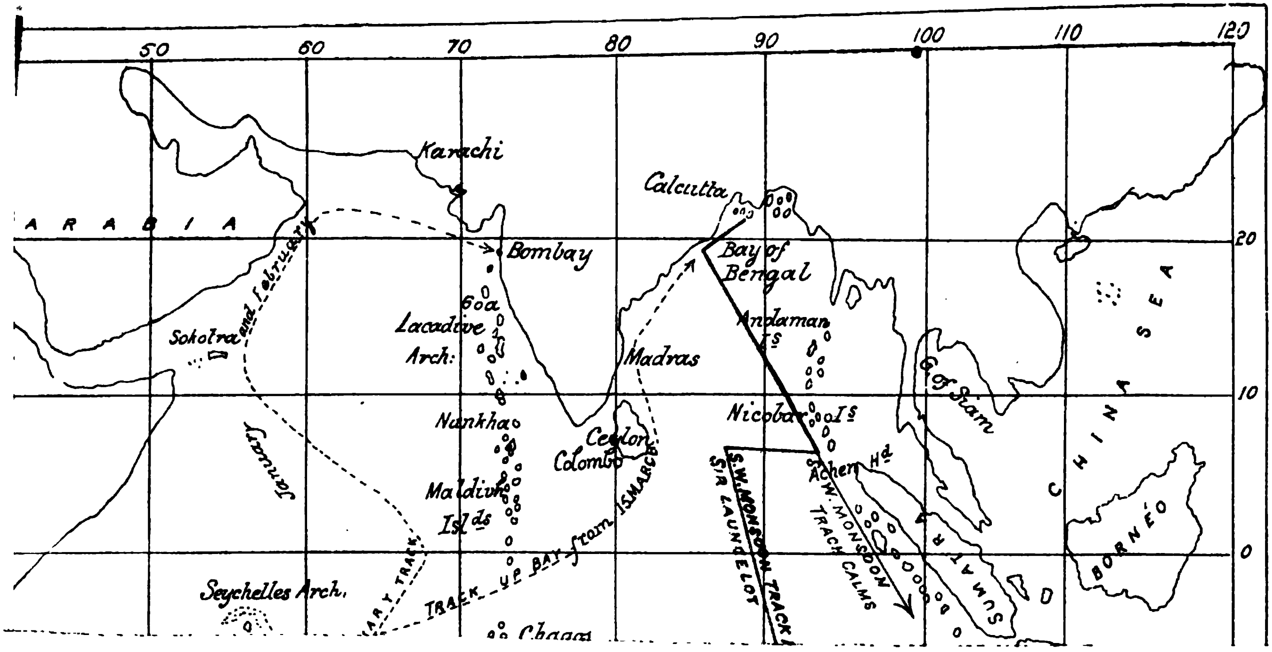
Ship "Northern Light."

In dealing with the discrepancy in the "Northern Light's" latitude on the fourth and fifth days of this unusual current, let us suppose she was in the position marked first day on plate and steering a straight course towards the African Coast averaging 200 miles per day. On the fifth day she would have been at the end of the straight line which was her course had she made it good. But on the fourth day she was set 84 miles due north at the end of the first dotted line. A course would then be set to cross her former track about the longitude of Cape St. Mary, south end of Madagascar. Again on the fifth day she was set 84 miles due south at the end of the second dotted line and south of her former track. After this day the changes were from east to west until this current came back to its usual track. What actually did happen on the two last days, the ship being near to Madagascar and somewhat in the influence of coast currents ? A cyclonic disturbance took place in the locality or south of it before the ship got in the position of the fourth day and changed the usual course of the current. The current that sets out of Antongil Bay forms two branches, one going north around Cape Amber into the Mozambique Channel, the other running south, both branches extending on an average of 80 miles off the coast, the northern branch hardly or ever changing its route, being influenced by the S. E. trade winds. The southern branch is greatly influenced by changes of winds. It may be setting south one day, and the next the wind may change to south. Within twenty-four hours the current will run north, and the greater the force of wind the greater the velocity of current. Coasting masters are well acquainted with the currents on the east, north, and south coasts of Madagascar. In working up against the wind they know how far to stand out to sea and how near to approach the shore. Strangers navigating the east coast of Madagascar, south of Antongil Bay, must bear in mind never to put explicit faith in a current setting continually to the southward, but as near as possible be guided by changes of wind, as for a certainty as there is a change of wind the current will run with the wind until the next shift.

Madagascar Currents.

North branch of Rodrigues Current.

The branch of current setting from Rodrigues, that has already been mentioned as deflected to the north after striking the coast off the north of Mauritius, runs between the islands to the north ; passing through these islands it takes a northwesterly course towards the east coast of Madagascar and joins that coming out


50
60
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ARABIA
Karachi
Bombay
Calcutta
Bay of Bengal
Andaman Is
Sokotra
and February
January
Goa
Lacadive Arch:
Madras
Nankhao
Ceylon
Colombo
Maldive Islds
Nicobar Is
Achen Hd
S.W. MONSOON TRACK
SIR LAUNCELOT
S.W. MONSOON TRACK CALMS
G. of Siam
CHINA SEA
BORNEO
SUMATRA
Seychelles Arch.
ARY TRACK
TRACK UP BAY from ISMARCH
Chagos

off Antongil Bay, 80 or 90 miles off the coast. The current from Cargados Corajos passes around Tromelin Island, joining the others at the same distance off shore in the vicinity of Angoncy or East Cape. All these branch currents now form one broad sheet of water extending perhaps to 100 miles off the coast; but masters on the coast generally allow for 80 miles, and run north towards Cape Amber. Between the East and North Capes there are about 20 large rivers and numerous smaller tributaries running into them all flowing into the sea, strengthening the current and causing it to rush with great velocity around Cape Amber. From April to October its velocity may reach 80 to 90 miles per day. During the above months it is greatly augmented by the S. E. trade winds, which blow strong, especially in May, June, July, and August. The northern limit of this current extends nearly to Farquhar Island, joining that from the Saya de Malla Bank and Agalega Island. All now take a westerly course towards the Cosmoledo Group, Assumption and Aldabra Islands. Here the northern portion is augmented by the Seychelles current, which from May to December runs through the Amirante Islands; afterwards, taking a S. W. course to the Cosmoledo, joins that of Madagascar and marches westwards like an advancing army towards the East Coast of Africa with a maximum velocity of 100 miles per day or more. The southern limit, after passing Cape Amber, flows between the Comoro Islands, where the currents are capricious, every point of land have a different set. Captain Septimus Welch, of the barque "Barretto Junior," wrecked on a reef near the N. W. end of Mayotte, one of the Comoro Islands, on 25th October 1859, in his report to the Mauritius Government, states that in September he had light winds (mostly from N. E.) and calms through the Mozambique Channel with a variable current, seldom running two days following the same way. On the west coast of Madagascar, in September, October, and November, northerly currents have been found close in shore setting north. Vessels bound round the Cape in these months, coming up from Johanna, should pass over the Castor Bank, working close in shore to Cape St. Sebastian; thence to about Port Liverpool, when they may manage to lay up sufficient to the north to clear the northern limit of the current from the East Coast. The brigantine "Mathilde," from Johanna in June, after beating off the Cape for a considerable time, being unable to double it, had to run south of Madagascar and run her easting down south. Coming from the same island in the middle of January with fresh westerly winds, she was 30 miles east of Cape Amber at noon, setting her course east so as to be well to windward of Mauritius in the trade winds. The following noon I found myself within a degree of Farquhar Island, which greatly astonished me, as the ship was supposed to have made six knots over the ground per hour. I shortly after got out of this current and made the passage across in 17 days, having carried westerly winds to within 300 miles of Mauritius. Strangers to navigation along this coast or island usually come to grief one way or another. The "Hattonburn," a barque, under favourable circumstances would easily sail eight knots per hour. She left Sambava in March 1896 for Angoncy East Cape, but was carried away north. After numerous fruitless attempts to reach her port of destination, she tried Farquhar Island for water and provisions, but was carried west of the island and could not beat up to it again. After 58 days at sea she eventually arrived at Mahé, Seychelles, where she was successful in obtaining a little freight for Mauritius. In October 1892 the schooner "Louis Alfred" left Mahé with an American tourist to visit first Glorioso, Cosmoledo Group, Assumption and Aldabra Islands. Having already visited these islands to the eastward, I may here mention that the giant tortoises seen at Seychelles are indigenous to Aldabra, as they are not to be found in any other part of the world. The master of the "Louis Alfred," somewhat a stranger, lay-to during the night 25 miles N. E. of Glorioso. At daylight he shaped his course for the island, and on obtaining observations he found he was 30 miles west of it. After beating about for two days trying to get back, and finding the vessel still being carried to the west, he tried to make for Cosmoledo, but missed that also. He at last succeeded in reaching Assumption and Aldabra, where the tourist discharged him and sent him back to Seychelles, with instructions to his agent to charter another vessel having the master with whom he made his first cruise.

On the arrival of the other vessel the expedition was successfully accomplished in two months. Respecting all that I have already said on these currents, I cannot produce a better testimony than the certificate delivered by the tourist to the master who took him around the Islands. It is here inserted with permission :—

> Captain Ludovic Ferrari, master of the schooner "Julie," of this port, went with me on a voyage for a month to Coetivy, Providence and the Amirante Islands. Found him to be a good navigator and well up to the rather difficult navigation of these seas among uncertain currents and coral reefs.
>
> (Sd.) W. L. ABBOTT, M.D.
>
> MAHE, SEYCHELLES,
> *September* 8, 1893.

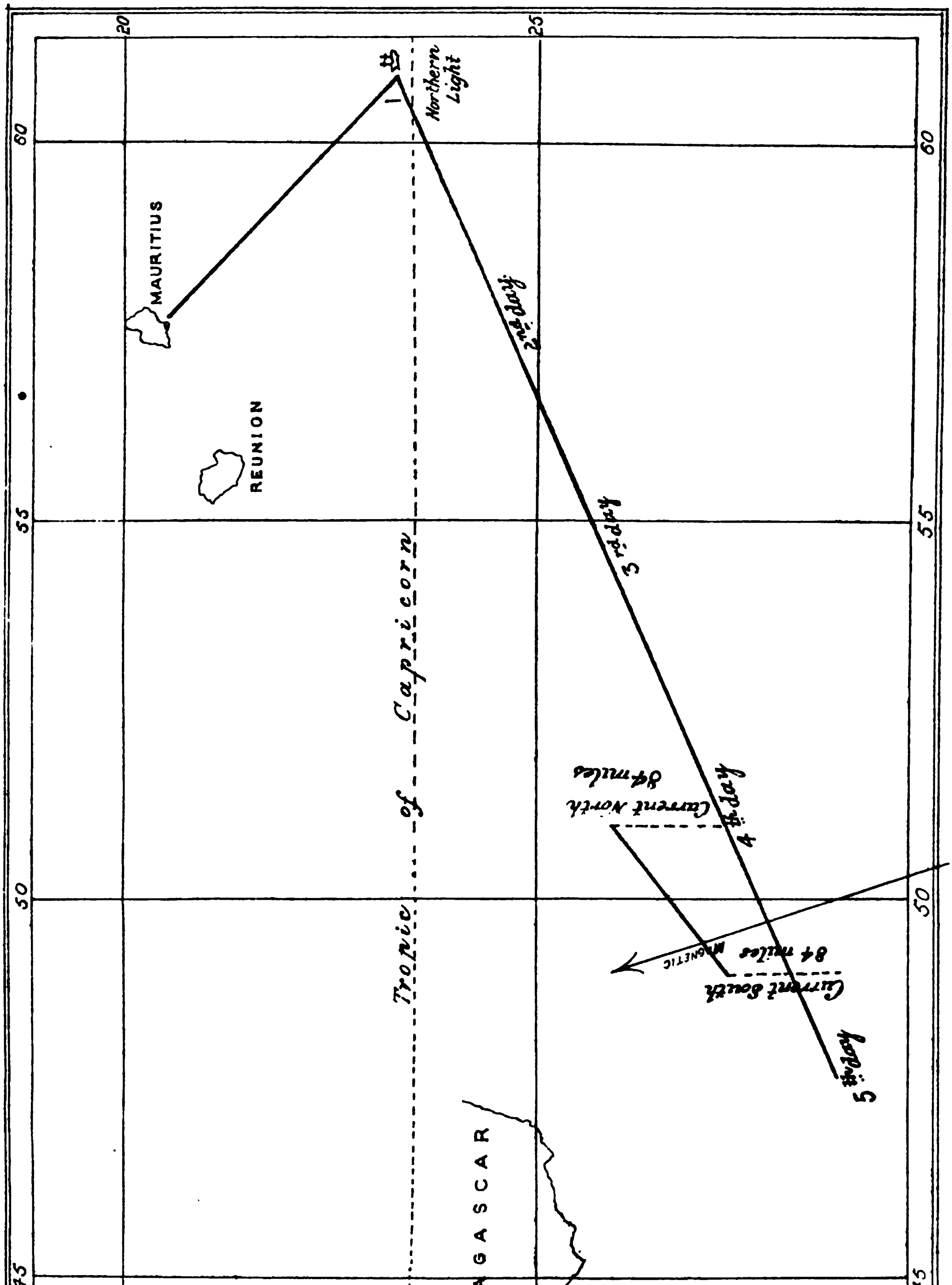
S. S. "Aymestry" wrecked by current on Farquhar Island, 1896.

In December 1896, a steamer bound to India through the Mozambique Channel, ran ashore S. W. of Cosmoledo. It appears that the master, not wishing to pass the island during the night, and perhaps ignorant of the strength of the current of this group, reduced speed, and was consequently driven on to the reefs by the current. An officer was sent in a boat to Zanzibar for assistance, and, as far as I am aware, she did receive assistance, and was put afloat and came on to Seychelles, probably for temporary repairs. I would strongly advise masters passing through these waters to verify their position during the night by stellar observations as opportunity offers.

Seychelles Currents.

The currents on the bank of soundings at Seychelles are extremely capricious, running for fifteen days in one direction, and then suddenly shifting to another, this being due perhaps to full and change. From December to May, which is the N. W. monsoon season, the current runs west 40 or 50 miles south of Alphonse Island, north of this it running east. In 6° S. and 54° E. in the vicinity of Des Roches Isles, the current runs N. E. in the above months to the bank of soundings. When S. E. trade winds prevail they set the opposite way. In examining the log book of the schooner "Lighter," I found that in August 1889, with fresh trade winds, she experienced an unusual strong set to S. E. in face of the wind between Mahé and Alphonse. Numerous wrecks have taken place in the Southern Indian Ocean between 25° and 4° N. during the last 35 years from cyclones and currents. These will be dealt with in a separate chapter ; but I may here state how miraculously sometimes vessels escaped being wrecked through currents even unknown to their commanders.

The owner of Isle Platte, one of the group to the east of Mahé, on one occasion, at 10 P.M., saw a vessel's side-light within a mile of the reefs of his island, had great doubts as to her weathering it, but she did. A few days after he went to Mahé and saw a vessel in harbour. In comparing notes with the master he found that the vessel was the same that passed his island on the night in question, but the master allowed he was to the east of it 40 miles at that time. No doubt he was carried to this dangerous position by the current, as his chronometer


20
25
60
55
50
45
Northern Light
MAURITIUS
REUNION
MADAGASCAR
Tropic of Capricorn
2nd day
3rd day
4th day
5th day
Current North 84 miles
Current South 84 miles
MAGNETIC

could not have been in error, having left Mauritius ten days previously. He may not have had P. M. sights to verify his position, the discrepancy between the morning sights at 8 A.M., if there were any, and 10 P.M., being considered large; but if the current was setting three knots per hour, this would cause the mischief. At the most northern part of the group the current sets east throughout the year, this being due perhaps to its not being influenced by the S. E. trade winds.

Easterly Currents.

It is this current that assists vessels in running easterly down on the equator in light wind.

Sayade Melha Bank.

Currents on this bank are uncertain and may or may not be met with. I make a practice of crossing them when the wind will allow. Some months in the bight on the S. W. side, I have had a set of 15 to 20 miles daily to the north coming from the south end of the bank. The overfalls will set a vessel fully 25 miles to the westward in 24 hours. Over all the places in the middle that I have steered over I have never had a less depth than that noted on the chart. Fine fish are to be had in abundance. Those who fish here should be careful not to eat a beautiful red fish which is in great quantity and easily caught. This fish is poisonous, and is called *vara-vara* by the Creole fishermen.

Poydenot Shoal.

The French Government has notified that Mr. Poydenot, commander of the Messageries Maritimes steam vessel "Armand Béhio," reports that having seen the bottom on the northern edge of Saya de Malha Bank, soundings of 4¾, 6 and 6½ fathoms were obtained in about Lat. 9° 45′ S., Long. 61° 25′ E.

Chagos Current.

Between the 1½° channel and the Chagos Archipelago, when going up or down the east side, a current setting east is usually encountered; but on the 24th August 1897, I experienced an unusually strong set first east and then north, continuing up to the 4th September.

Position by observation	24th	August,	Lat.	2°2′ S.	Long.	76°40′ E.
" "	25th	"	"	2°21′ S.	"	77°43′ E.
" "	26th	"	"	2°21′ S.	"	78°25′ E.
" "	27th	"	"	2°35′ S.	"	78°30′ E.
" "	28th	"	"	3°15′ S.	"	77°48′ E.
" "	29th	"	"	3°25′ S.	"	76°53′ E.
" "	30th	"	"	3°32′ S.	"	77°9′ E.
" "	31st	"	"	4°27′ S.	"	77°36′ E.
" "	1st	September	"	5°15′ S.	"	77°31′ E.
" "	2nd	"	"	5°14′ S.	"	77°52′ E.
" "	3rd	"	"	5°42′ S.	"	76°45′ E.
" "	4th	"	"	6°37′ S.	"	75°46′ E.

The wind was from east moderate with smooth sea, the ship steering south most of the time, and could easily have made three knots throughout, and would have passed Diego Garcia on the 19th had there been no current.

In the middle of January 1898, between a position 180 miles due east of Diego Garcia and Lat. 10° 8′ S., Long. 70° 50′ E., a current was found to set west, fully 40 miles daily, the wind being light and variable from N.W. to N.E. south and west of above position with moderate trade winds and having no current until between Rodrigues and Mauritius.

The schooner "Louis Alfred" from Mauritius to the Chagos Archipelago in the previous January and on the 1st of that month experienced a current setting west at 2 miles per hour, commencing at Lat. 10° S., Long. 64° E. right up to Six Islands. The wind was light and variable from W. N. W. to N. W.

CHAPTER X.

METEOROLOGY.

METEOROLOGICAL observations at Mauritius for the year 1892 compared with those of the previous 18 years taken by Dr. C. Meldrum, C.M.G., LL.D., F.R.S., late Director of the Royal Alfred Observatory, who acted in this capacity for more than forty years.

Monthly mean of temperature in shade and atmospheric pressure.

The following table gives the monthly mean of the temperature of the air and atmospheric pressure for the eighteen years, 1875 to 1892, and for the year 1892 :—

TABLE I.

Months.	Temperature of air. 1875 to 1892.	Temperature of air. 1892.	Atmospheric pressure at sea level. 1875 to 1892.	Atmospheric pressure at sea level. 1892.	Months.	Temperature of air. 1875 to 1892.	Temperature of air. 1892.	Atmospheric pressure at sea level. 1875 to 1892.	Atmospheric pressure at sea level. 1892.
	Deg.	Deg.	Inches.	Inches.		Deg.	Deg.	Inches.	Inches.
January	78·3	78·6	29·955	29·952	July	68·6	69·3	30·205	30·185
February	78·2	78·8	29·238	29·856	August	68·6	69·7	30·202	30·149
March	77·5	77·7	29·970	29·910	September	69·7	69·1	30·199	30·219
April	76·1	76·9	30·016	29·954	October	71·5	71·3	30·139	30·126
May	72·7	74·3	30·086	30·082	November	74·5	74·3	30·074	30·058
June	70·0	71·8	30·167	30·133	December..	77·1	76·7	30·012	30·034
Mean ..	..	..	..	..	Mean ..	73·6	74·1	30·080	30·055

In 1892 the temperature of the air was 0° 5′ above the average for the last 18 years, and above the average in every month except September, October and December.

The greatest deviations were 1° 6′ and 1° 8′ above in May and June and 0° 6′ below in September.

The pressure was 0·025 inch below the average, and it was below the average in every month except September and December. The greatest deviations were 0·060 and ·062 inch below in March and April and ·022 inch above in December.

TABLE II.

Monthly means of the direction and velocity of the wind.

The monthly means of the direction and velocity of the wind, deduced from the daily records of a Beckley anemometer, were as follows :—

Months.	Direction. 1876 to 1892.	Direction. 1892.	Direction. Deviation from average in 1892.	Observed velocity in miles per hour. 1876 to 1892.	Observed velocity in miles per hour. 1892.	Observed velocity in miles per hour. Deviation from average in 1892.
January	S 88° 41′ E	S 80° 59′ E	S 7° 42′	11·1	10·5	—0·6
February	S 82° 07′ E	S 82° 08′ E	N 15° 45′	11·3	13·0	+1·7
March...	S 78° 36′ E	S 68° 29′ E	S 10° 07′	9·9	7·4	—2·5
April	S 71° 11′ E	S 74° 09′ E	N 2° 58′	10·7	8·7*	—2·0
May	S 64° 17′ E	S 56° 47′ E	S 7° 30′	10·0	10·1	+0·1
June	S 61° 27′ E	S 63° 37′ E	N 2° 10′	11·5	13·8	+2·3
July	S 64° 04′ E	S 63° 29′ E	S 0° 35′	11·9	12·9	+1·0
August	S 67° 12′ E	S 73° 15′ E	N 6° 03′	12·2	11·6	—0·6
September	S 69° 42′ E	S 67° 21 E	S 2° 21′	12·1	13·9	+1·8
October	S 77° 20′ E	S 75° 41′ E	S 1° 39′	11·4	10·0	—1·4
November	S 82° 24′ E	S 88° 52′ E	N 6° 28′	10·9	10·6	—0·3
December	S 89° 44′ E	N 79° 20′ E	N 10° 56′	10·9	8·6	—2·3
Mean...	S 74° 00′ E	S 74° 44′ E	N 0° 44′	11·2	10·9	—0·3

* Velocity for the 29th is included in the monthly mean.

TABLE III.

The highest and lowest pressures in each month of 1892 and for the period 1875-92.

The highest and lowest atmospheric pressures in each month of 1892, reduced to sea-level, and the highest and lowest for each month of the year in 1875—92, were as follows :—

Months.	Barometer 1892.				Barometer from 1875—92.			
	Highest. Inches.	Day.	Lowest. Inches.	Day.	Highest. Inches.	Day and Year.	Lowest. Inches.	Day and Year.
January	30·076	1	29·754	17	30·169	30, 1881	29·390	13, 1876
February	30·040	1	29·825	12	30·170	23, 1881	29·064	10, 1877
March...	30·090	23	29·704	4	30·193	14, 1888	29·032	21, 1879
April	30·148	3	27·956	29	30·258	14, 1888	27·956	29, 1892
May	30·208	30	29·932	4	30·305	17, 1877	29·841	2, 1877
June	30·253	25	29·917	19	30·468	20, 1877	29·892	29, 1878
July	30·353	20	30·032	26	30·453	8, 1880	29·945	5, 1878
August	30·260	31	29·993	23	30·426	21, 1891	29·881	10, 1882
September	30·315	7	30·119	30	30·387	21, 1878	29·902	5 1878
October	30·264	16	29·962	25	30·340	7, 1877	29·911	27, 1885
November	30·211	12	29·827	27	30·301	8, 1886	29·827	27, 1892
December	30·125	17	29·897	10	30·210	7, 1876	29·550	19, 1879

The highest pressure in the year 1892 was 30·353 inches on July 20th, and the lowest 27·956 on April 29th, which was also the lowest recorded pressure at Mauritius.

The highest pressure in the period 1875—1892 was 30·468 inches on June 20th, 1877.

SKY-GLOWS AND CLOUD COLOURATIONS.

The dates of the principal sky-glows and cloud colourations for 1892 were as follows :—

January.—On 1st a fine first after-glow and a faint second glow, and fainter ones on 2nd. Upper clouds red after sunset on 2nd. On 3rd a large but not intense first after-glow. On 5th upper clouds red all over the sky after sunset. On 8th, after sunset, upper clouds fiery red in all directions, but chiefly at south-westward. On 18th after sunset, upper clouds red nearly all over the sky. On 24th, 26th and 27th double after-glows, but not intense. On 29th cirrus clouds bright red before sunrise at eastward and south-eastward.

February.—At sunset on 2nd and at sunrise on 3rd, upper clouds yellowish red. On 8th and 9th, upper clouds red and yellowish red before sunrise, and on 10th, deep red after sunset at southward and south-eastward. On 23rd, a rather fine first after-glow, but no second. On 24th, before sunrise, upper clouds yellowish red all over, and also before sunrise on 26th.

March.—On 10th, at sunset, sky very bright golden yellow, and afterwards bright red. On 20th and 21st, upper clouds bright red before sunrise. On 25th and 26th, rather fine first after-glows, but no second. On 28th, after sunset, and on 29th before sunrise, upper clouds very red all over the sky. On 31st, a first after-glow with beams, and clouds near horizon dark red.

April.—On 16th, at sunrise upper clouds red at eastward. On 24th, 25th and 26th, rather fine and large first after-glows and faint second-glows. On 26th after sunset, and on 27th before sunrise cirrus clouds bright red.

May.—On 5th, 12th, 16th, 19th, and 29th, upper clouds, copper coloured and light red. Rather fine first and second after-glows on 28th, 29th and 30th.

June.—On 1st, 19th, 25th and 26th rather fine first and second after-glows.

July.—Fine first after-glows nearly every evening from 14th to 26th, with faint second glows.

August.—On 8th, a fine first after-glow and a faint second glow. On 28th, a fine first after-glow, but no second glow.

September.—On 3rd and 14th, lower clouds reddish at eastward at sunrise. After-glows on 16th, 17th, 20th, 28th, and 29th, but not intense.

October.—Fine first after-glows and faint second glows on 21st, 22nd and 23rd; unusually red sunrises and sunsets from 27th to 30th.

November.—On 8th, clouds at westward reddish at sunset. On 10th and 12th, faint first after-glows. On 29th, western sky near horizon fiery red after sunset.

December.—From 12th to 20th, fine first and second after-glows. On 22nd and 24th, upper clouds bright red before sunrise and after sunset. On 25th, a fine after-glow, with beams from near horizon, up to 60°. On 27th and 31st, upper clouds bright red before and after sunrise.

The lower clouds generally travelled in the same directions as the surface winds, and the upper from westward, north-westward, and south-westward.

THUNDER AND LIGHTNING, 1892.

January 2.—Thunder at north-westward from 18h. 30m. to 19h., and lightning in the evening at north-westward.

January 3.—In the evening lightning at northward.

January 16.—Distant thunder and lightning between 4h. 30m. and 5h. 30m. at westward.

January 18.—Thunder at eastward, south-eastward, south-south-eastward from 15h. 17m. to 17h. 30m. Lightning at eastward in the evening.

January 19.—Thunder and lightning at intervals and southward, south-eastward to east-north-eastward, from 11h. 21m. to 13h. 20m. Thunder at south westward at 15h. 11m. Several peals of thunder at eastward from 18h. 30m. to 18h. 40m. Lightning at east-south-eastward in the evening.

January 20.—Thunder at eastward from 9h. 18m. to 9h. 30m.

February 16.—Thunder and lightning at westward, south-westward, southward, south-eastward, eastward and overhead from 13h. to 15h. 25m.

February 25.—Much lightning at north-westward in the evening.

February 26.—Lightning between 20h. and 21h. at westward.

February 27.—Faint lightning at 5h. at westward and in early evening at westward, west-south-westward and south-westward. Thunderstorm at northward, westward and west-south-westward, late in evening, with vivid flashes of lightning and forked lightning at times. Constant flickering. Chiefly at north-westward.

March 4.—Distant thunder at north-eastward from 13h. 23m. to 13h. 27m. Between 18h. and 19h. distant thunder and lightning at west-south-westward.

March 6.—At 7h. 45m. thunder at north-westward, and at 11h. 30m. at eastward. Distant thunder and lightning at southward in the evening.

March 8.—Distant thunder and lightning began about 23h. at northward.

March 9.—A thunderstorm from 0h. to 10h. 45m.; much thunder and lightning chiefly at northward; lightning in evening chiefly at south-south-eastward.

March 10.—Between 14h. 20m. and 14h. 55m. distant thunder at southward.

March 16.—Distant thunder and lightning between southward and eastward at intervals during the night.

March 17.—From 2h. 30m. to 5h. 40m. loud thunder with vivid lightning at times from eastward, north-eastward overhead and northward. Thunder continued at intervals up to 18h. Lightning at northward during the evening and night.

March 18.—Lightning at northward during the morning. Several distant peals of thunder at about 3h. Thunder and lightning from eastward to overhead, westward and southward from 11h. 30m. to 17h. Thunder and lightning at northward in the evening.

March 21.—Several faint flashes of lightning at northward in the evening.

March 31.—Thunder at south-westward at 15h. (heard at St. Peirre, Moka).

April 11.—Much lightning and thunder at north-westward, northward and north-eastward from 5h. to 8h. 40m.

April 12.—At 17h. 30m., thunder at eastward. Lightning in the evening at eastward.

April 14.—Lightning at westward in the evening.

April 17.—Thunder at southward and south-eastward from 14h. 17m. to 14h. 48m.

April 27.—Lightning at northward after 19h. and thunder at 20h. 42m.

April 28.—Thunder and lightning during the morning at north-eastward, eastward and overhead, continued to 5h. 20m. Lightning at westward in the evening.

May 5.—Between 15h. 8m. and 16h., distant thunder at south-eastward and east-south-eastward.

May 6.—Thunder at south-westward, westward and in the zenith from 11h. 23m. to 11h. 50m.

May 19.—Lightning at northward and north-westward in the evening.

December 6.—Between 20h. and 20h. 15m. several flashes of lightning at southward.

December 8.—Thunder with vivid lightning between 4h. 20m. and 6h. 52m., at south-eastward, south-westward and westward. Lightning in the evening at south-westward.

December 9.— Between 19h. 3m. and 20h. 30m., several flashes of lightning at south-eastward.

December 24.— In the evening, lightning at south-westward.

December 25.—Between 2h. and 2h. 30m., thunder and lightning at south-eastward.

December 26.—Lightning at west-south-westward in the evening.

December 29.—Lightning at westward in the evening.

December 30.—Lightning at westward in the evening.

MAGNETIC DISTURBANCES IN 1892.

The following is a brief account of the most remarkable of them :—

February 13-15.—A large magnetic storm began at 8h. 55m. on the 13th. The beginning is distinctly shown on the three curves.

The horizontal force was most disturbed. Between 8h. 55m. and 14 hours, the magnet was in a continual state of oscillation, the force on the whole increasing. The maximum was reached at 13h. 43m. The force then began to decrease, reaching its minimum at 0h. 15m. on the 14th. At 4h. 30m. of the 14th a very abrupt movement occurred in all the curves, the movements being so quick that the light had no time to act on the sensitive paper. After that hour the oscillations were very numerous, the magnets being in a continual tremor, especially the horizontal force magnet. After 19 hours, the oscillations gradually died out, and by 3 hours of the 15th, the magnets were quiet.

March 12 & 13.—This disturbance began suddenly at 3h. 26m. on the 12th in all the curves; the movements denoting an increase in the horizontal and vertical forces and a decrease or easterly movement in the declination.

The declination decreased 8'-8" from 2h. 26m. to 3h. 6m., and then increased, reaching the maximum westerly position at 7h. It then decreased and reached its maximum easterly position at 13h. 24m.; the range being 17'-0". The north end of the magnet then moved to the west, the curve showing a series of small oscillations, which had died at 9h.

The horizontal force increased 0·01188 mms. unit, from 2h. 26m. to 2h. 55m. It then decreased rapidly up to 4h. 50m., the decrease equalling 0·02057 mms. unit. From the latter hour up to 7h. of the 13th, when the disturbance may be said to have died out, the curve shows a succession of undulations, the mean value of the force being constant. The extreme range was 0·02241 mms. unit. The vertical force curve shows minute tremors from 2h. 26m. up to 17h. of the 12th, and subsequently small oscillations, but, as usual, of smaller extent than those shown by the curves of the two other elements. The minimum occurred at 13h. 24m. of the 12th, and the maximum at 0h. 5m. of the 13th, the range being 0·00348 mms. unit.

April 25-27.—In the horizontal force curve, the disturbance began not very suddenly at 19h. 30m. on the 25th and continued to 5h. of the 27th. On the whole the force decreased at first, reaching its lowest value at 16h. 5m. of the 26th. It then increased and reached a maximum at 0h. 50m. of the 27th. The range from maximum to minimum was 0·02036 mms. unit.

In the declination curve, the disturbance first became noticeable at 21h. 34m. on the 25th, the declination on the whole decreasing (north end moving to the east). It was least at 8h. of the 26th. The maximum westerly position occurred at 18h. 10m. of the 26th, the range being 12·0'.

The disturbance is hardly noticeable in the vertical force curve.

July 16 & 17.—A magnetic storm began suddenly at 16h. 28m. of the 16th. In the declination, the disturbance began with some very rapid oscillations, so that the trace is blurred. The maximum occurred at 23h. 20m. of the 16th and the minimum at 3h. 35m. of the 17th, the range being 14·5'. After the latter hour, there was a westerly movement, followed by another easterly one up to about 7h. 30m. of the 17th. Between 15h. and 16h. some rapid oscillations occurred. The disturbance died out about midnight of the 17th.

In the horizontal force, the disturbance began suddenly at 16h. 28m. of the 16th, by an increase of force. The oscillations during the next hour were so rapid that the trace is indistinct. Then follow some small tremors up to 21h. The intensity of the storm was greatest from the latter hour up to 4h. of the 17th. The oscillations were so frequent and so rapid that in some parts the trace is faint, the light not having had time to act on the sensitive film. The maximum force occurred at 21h. 12m. and the minimum at 23h. 10m., the range being 0·02271 mms. unit.

After 4h. of the 17th and up to 14h. 52m. slight tremors and oscillations occurred.

Between 14h. 52m. and 15h. 53m. there were some rapid movements, the trace being again blurred. From 19h. to midnight there were frequent but small oscillations. The movements were on a smaller scale, but perfectly distinct in the vertical force. The disturbance began at the same time by an increase of force. There were very small but frequent tremors up to about 21h. 12m. of the 16th., when a large and sudden increase of force took place, after which followed larger and frequent oscillations gradually diminishing and dying away at about 8h. of the 17th. Between 14h. 50m. and 15h. 53m. of the 17th, the magnet was in a state of continual tremor. The maximum occurred at 21h. 12m. and the minimum at 21h. 12m. of the 16th; the range being 0·01080 mms. unit.

August 12 & 13.—A storm of considerable intensity, but of short duration, began suddenly in the three curves at 16h. 25m. of the 13th, the increase in horizontal and vertical forces being 0·00594 and 0·00216 mms. unit respectively. On the whole, the westerly declination increased during disturbance, the maximum being reached at the unusual hour of midnight of the 13th, after which the north end of the magnet moved eastward, reaching its maximum easterly position at 6h. 15m. on the 13th, the range being 13·9′.

After the first sudden increase in the horizontal force at 16h. 25m., the force on the whole decreased up to 21h. 35m., when a series of sudden and large changes in the force occurred. Between 21h. 35m. and 22h. 27m., the force increased by 0·01620 mms. unit, and 10 distinct oscillations can be traced in the interval. After 22h. 27m., the force decreased to its minimum at 23h. 40m., the decrease equalling 0·03078 mms. unit, the trace continuing to show small oscillations and tremors. After the epoch of minimum, the force on the whole increased, but did not recover the value it had before the disturbance began, until 9h. of the 14th. The disturbance died out about 13h. of the 13th. The range was 0·03494 mms. unit.

The vertical force also decreased during this disturbance, the curve after 16h. 25m. (epoch of maximum), showing small tremors up to 21h. 35m., when the oscillations became larger and more frequent; the force on the whole still decreasing and reaching its minimum at 0h. 4m. of the 13th. It then increased, slight tremors being visible until 13h. The range was 0·00456 mms. unit.

Sun spots.—Spots were seen on 350 days, but it is known that spots were visible on every day of the year. The increase in the size and number of the spots during the year was very marked. The largest groups were those seen from February 5th to 18th, May 10th to 22nd, May 24th to June 5th, July 4th to 16th, July 24th to August 6th, and October 3rd to 11th. February and July were the months of most spots.

TROPICAL AND SUB-TROPICAL CYCLONES.

Since 1889 the number of cyclones in the South Indian Ocean has considerably increased. In that year, so far as I am aware, no tropical cyclones were recorded. In 1890 there were three small cyclones, in 1891 four cyclones of longer duration and greater intensity, and in 1892 nine cyclones, some of which were very severe and destructive.

April 29th, 1892.—The cyclone of the 29th April, 1892, was an unprecedented one for Mauritius with regard to time of year, direction and force of wind, and the suddenness, rapidity and extent of the changes which took place. Nearly all the loss of life and property occurred within the short space of two hours. The official reports shew that in this short space of time 1,200 persons were killed and 2,000 wounded, while one-third of the houses in Port Louis were blown down, with the result that upwards of 20,000 of the population were left destitute of house or home. The energetic Governor, Sir H. E. H. Jerningham, K.C.M.G., saved the Colony on this occasion from sharing the fate of St. Johns, Newfoundland.

Cyclones and Storm-Warnings from C. Meldrum, Director of the Royal Alfred Observatory.

From the 12th to the 18th of January, a cyclone travelled from about 11° to 24° S. and 56° to 52° E. It was experienced by the S.S. "Invertay," the

"Alert," and other vessels. At Mauritius the barometer fell from 29·930 inches at sea level at 9 A.M., on the 11th, to 29·754, at 4 P.M. on the 17th, and the wind veered from S. E. by E. to E. N. E., and N. W., its greatest average velocity for one hour being 23½ miles.

On the 13th the following note was sent to the newspapers :—

"Heavy weather to the northward since Monday (the 11th), but no danger."

From the 12th to the 17th of January, a cyclone occurred also in 6° to 14° S. and 88° to 90° E.

Another cyclone was experienced in 14° to 26° S. and 59° to 57° E. from the 10th to the 14th of February. It travelled in a south-westerly course, passing over St. Denis (Réunion) at 11h. 30m. P.M., on the 12th, and thence to the southward and south-eastward. It was encountered by the "Evelina," "William Turner," Centre-Amerique, "M.M.S.," "Pei-Ho," &c.[*]

At Mauritius the barometer at 9 A.M. on the 10th was at 29·901 (corrected and reduced to sea level), with the wind moderate from E. S. E., to which it had backed from E. by N. since the 8th. This backing of the wind, though the barometer was high and falling very little, was not a favourable sign, and at 1-45 P.M. on the 10th, a notice of it was sent to the newspapers. On the 11th and 12th fourteen telegrams were sent to different parts of the island. At 2-30 P.M. on the 11th, it was stated that the cyclone was passing N. and N. W. of the island; at 9 A.M. on the 12th, that the indications were favourable, so far as Mauritius was concerned; and at 2-10 and 3-15 P.M., that, though the centre had approached, there was no fear of more than a strong gale at the utmost.

The greatest velocity of the wind for one hour was 47·5 miles between 3-30 and 4-30 P.M. on the 12th, and the lowest barometer (at sea level) 29·354, at 4-45 P.M. on the 12th. Owing to the close proximity of the telegraph wires to trees, telegraphic communication was interrupted all over the island. At St. Denis (Réunion), the barometer fell to 732 mm. (28·819), the wind increasing to a hurricane from south-eastward, and after a calm, passing to N. E. and N. W.

From 4-45 P.M. on the 12th to noon on the 18th the barometer at Mauritius rose from 29·354 to 29·970, with light northerly and north-westerly winds, and it then fell to 29·816 at noon on the 21st with a light wind from N. N.-W., and fine weather.

From the 20th to 22nd a fourth cyclone was experienced in 25° to 29° S. and 52° to 48° E. by the French Barque "Alsace Lorraine" and the S. S. "Gladiator." The barometer of the "Alsace Lorraine" fell to 28·96 inches, and her mainmast was carried away by the force of the wind.

From the 24th to the 29th of February another cyclone was experienced by the "William Turner," "Lorna Doone," "Evelina," "Alert," &c., in 14° to 26° S. and 65° to 47° E. It travelled on a south-westerly course reaching the coast of Madagascar on the 28th in about 21° 25′ S. and 48° 5′ E. and committing much damage at Mahanazary and Mahela, where the barometer fell to 7-30 mm. (28·740).

At the Mauritius observatory the barometer fell from 29·899 at 9 A.M. on the 24th to 29·555 at 4-45 P.M. on the 26th, and then rose to 29·856 at 9 A.M. on the 29th. The wind veered slowly from S. E. to E. N. E. and attained a maximum velocity of 29·1 miles per hour from E. between 3-30 and 4-30 P.M. on the 26th On the 25th the following note was sent to the newspapers at 1 A.M. :—

"Barometer at 29·709 and falling slowly. Wind from S. E. by. E. at the rate of 27 miles an hour, a cyclone at N. N. E. but no immediate danger. At present impossible to say whether the centre will pass east or north of the island or over it."

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[*] The steamer "Deccan," with a large number of passengers bound from Mauritius for Bombay must have foundered between the 10th and 14th February.—C. W. B.

At 3, 4, and 5 P.M. on the same day, telegrams were sent to the Port Office and different parts of the Colony, stating that there was no fear of more than a fresh gale before 10 A.M. on the 26th. On the 26th and 27th twelve telegrams were sent out at 10 A.M. On the 26th it was stated that the centre was passing slowly north of Mauritius at a safe distance, and that the velocity of the wind would not exceed 40 miles an hour; at 4 P.M., that the wind was from E. ½ N. at the rate of 29 miles an hour, that the centre was passing N. W. and W. but that preparations should be made for a fresh gale, though probably the velocity of the wind will be less. At 10 A.M. on the 27th the barometer was stated to be at 29·668 and rising, that the wind was from E. by N. ½ N. at the rate of 24 miles an hour, and that there was no danger.

The island was not threatened by any cyclone in March. At 9 A.M. on the 24th of April the barometer, reduced to sea level, was at 30·063, with a light breeze from E. S. E. ½ S. and fine weather, and it gradually fell to 29·900 at 9 A.M. on the 27th with a moderate breeze from E. by. S. and fine weather.

This falling of the barometer and veering of the wind with the sea beginning to make a noise on the reef at N. W. indicated the existence of a cyclonic disturbance away to the northward, and at 1-30 P.M. of the 27th I sent the following note to all the newspapers:—

"Heavy weather to the northward since the 24th."

But as, since at least 1691, no severe gale had ever been experienced in Mauritius later than the 12th of April, while cyclones in the South Indian Ocean to the northward of Mauritius in April and even in May, were not unusual, no fear was entertained.

At 9 A.M. on the 28th the barometer was at 29·905 (which was higher than at the same hour on the 27th), with the wind from N. E. by E. at the rate of 12·3 miles an hour; and at 9 P.M. at 29·850, with the wind from N. E. ½ E. at the rate of 14·5 miles an hour. On the morning of the 28th the weather was nearly calm, with much thunder and lightning, and there was also frequent lightning in the evening of the 28th. But no hurricane in Mauritius had ever been immediately preceded by thunder and lightning.

From 3-15 P.M. on the 27th to 11 A.M. on the 29th, I was not at the Observatory, as on the 28th I repaired to my office at the Port Department in Port Louis, where log books are being copied, with the object of determining the tracks, &c., of the cyclones of the South Indian Ocean. While here I informed the Harbour Master that, owing to the lateness of the season, the direction of the wind, &c., it was not probable that the cyclone would pass near Mauritius, though a heavy sea might roll into the harbour on the following day.

In my absence on the 28th the First Assistant despatched from the Observatory at 1 P.M. the following telegram in reply to a request from His Honor the Officer Administering the Government for a report on the weather:—

"The barometer has fallen 0·150 inch since the 24th and is still falling. The wind has veered from S. E. by. E. on the 25th to N. E., which is its present direction, the velocity being 22 miles per hour. Lightning and thunder were observed from 7 o'clock last night up to 5-20 this morning, chiefly at N. E. The lower clouds are now coming from N. N. E. Since the 24th there has been heavy weather north of the island. We are now under the influence of the N. E. monsoon, and there is no danger whatever."

As no danger was anticipated, none of the Assistants stayed at the Observatory during the night of the 28th and 29th; but the Second Assistant arrived there at 6 A.M. on the 29th, and at 9-55 A.M. he despatched the following telegram to His Honor the Officer Administering the Government:—

"At 9 a.m. barometer (corrected and reduced to sea level) 29·576 and falling rapidly; since 6 A.M. it has fallen ·084 inch. Wind from E. N. E. ½ N., at the rate of 40 miles per hour. The disturbance, as indicated by the backing of the wind, is recurving and approaching the island. More details will be forwarded at noon."

The First Assistant arrived at the Observatory at 10-15 A.M. on the 29th, and at 10·25 A.M. he despatched the following telegram:—

"At 9 A.M. barometer 29·576 and falling rapidly; wind from E. N. E. ½ N. 40 miles an hour. The disturbance has developed increased energy during the night and is approaching the island. This weather is quite exceptional, no gale having been recorded in Mauritius after the 10th of April."

I left Moka at 9 A.M. on the 29th, and a few minutes after my arrival at the Observatory at 11 A.M., sent telegrams to different parts of the island, stating that the barometer was at 29·338 and falling, that the wind was from N.-E. by E. at the rate of 52 miles an hour in the squalls and veering slowly to northward, that telegrams would be sent hourly, that probably the velocity of the wind would not exceed 56 miles an hour, but that preparation should be made for a heavy gale.

The reasons why it was considered that the force of the wind would not exceed that of a strong to a whole gale were that Mauritius had never been visited by a hurricane after April 12th, and that the wind was from N. E. which had never been regarded as a dangerous quarter at any season of the year, no hurricane having ever passed over the Island from N. E. Not later than the 12th of February (1892), the barometer fell to 29·354 with the wind from N. E., but the cyclone passed W. and S. W. of the island, and the velocity of the wind did not exceed 48 miles an hour.

Another telegram was prepared for noon, but it was afterwards found that at about 10-30 A.M. all telegraphic communication had been interrupted. The barometer continuing to fall at a rapid rate and the wind to increase, it was thought that, contrary to long experience, the centre of the cyclone would probably pass over the Island from N. W., and that the wind would then blow from S. W. The centre, however, did not pass over the observatory. The wind there veered from N. E. to N., W. N. W., W. and W. S. W., increasing to an average velocity of 88·9 miles an hour from N. E. between 0-30 and 1-30 P. M. decreasing to 65·1 miles from N. E. between 1-30 and 2-30 P.M., increasing a few miles from W. N. W. between 2-30 and 3-30 P. M. and then increasing rapidly to 103·3 miles from W. S. W. between 3-30 and 4-30 P.M., after which it decreased. There was thus a lull, but not a calm. At no time during the lull was the rate of the wind less than that of 34 miles an hour. As far as could be ascertained, the greatest velocity of the wind for five minutes was at the rate of 121·2 miles from 3-46 to 3-51 P. M.

From noon to 2 P.M. the barometer fell from 29·062 to 27·990 and from 3 to 5 P.M. it rose from 28·928 to 29·073, the mercury oscillating considerably between 1-30 and 3-30 P.M. The lowest reading of the barometer (as shown by the barogram) was 27·956 at 3-12 P.M., which is the lowest on record for Mauritius. After 5 P.M. the velocity of the wind decreased rapidly, and by 9 P.M. it blew at the rate of only 26 miles an hour, the barometer then standing at at 29·718, the weather fine, and stars shining brightly.

The lowest barometric reading at sea level recorded previous to this cyclone is that of the False Point cyclone, 19th to 23rd September 1885. During the passage of the storm's centre over the Light-house the lowest reading was 27·135.

The cyclone was experienced at sea by the S.S. "Durobin Castle," the Austrian barque "Nermirna," the Swedish barque "St. Vincent," and several other vessels.

There is no evidence in the information obtained of a hurricane till the 29th.

At noon of the 26th there were signs of a cyclonic movement, the centre of which was apparently in 11° 40′ S. and 61° 12′ E., and as far as can be ascertained, it travelled thence on a S. W. course to 17° 15′ S. and 55° 16′ E. at noon of the 28th and afterwards on S. and S. E. course to 19° 50′ S. and 56° 58′ E. at noon on the 29th, its intensity increasing greatly on the morning of the latter day. After its centre had passed over Mauritius, it travelled rapidly to the S. E. with diminishing force, reaching 23° 26′ S. and 64° 30′ E. at noon on the 30th, beyond which it has not been traced. On the 29th, when the centre was over Mauritius, the barometric gradient was very steep; at 3 P.M. the pressure was 28·028 inches, while at St. Denis (about 120 miles to the W. S. W.) it was 29·437.

At Rodriques the barometer fell from 30·050 at 9 A.M. on the 24th to 29·897 at 3 P.M. on the 26th, and then rose to 29·950 at 9 A.M. on the 29th.

There was a very high sea at Réunion, but not much wind.

At St. Brandon, from the 26th to the 30th, the wind veered from E. to N. E. N. N. W., W. and W. S. W. in strong breezes, the lowest reading of the barometer being 29·390.

Captain Ellis, of the "Miako," has reported that in March (the date is not given) the "Tamerlaine," which arrived at the Cape on the 2nd of April, experienced a terrible hurricane in 28° S. and 90°E.

There were indications of a cyclonic disturbance to the N. E. of Mauritius from the 29th to the 31st of May, the "Invertay," "Merle," &c., experiencing on those days strong gales from S. E. to S. and S. W. with a terrible sea and heavy squalls and rain, in 5° to 18° S. and 7° to 52° E.

On the 17th and 18th of October the "Calcutta" in 15° S. and 86° E. experienced a storm from E. S. E. to S. E. by S. with a mountainous sea; during which she lost her bulwarks. The barometer fell to 29·76. Unfortunately want of date it is not known whether there was a cyclone.

It should be stated that the telegrams sent from the Observatory at 9·55 A.M. and 10-25 A.M. on the 29th of April, to be forwarded from the Pamplemousses Station, did not reach their destination.

Dovenby Hall Cyclone—Account by the Chief Officer, M. J. Sullivan.

June 3rd, 1892.—In Lat. 39° 40′ S. Long. 36° 40′ E., wind increasing from W. N. W. and N. W., barometer falling and sea rising rapidly with heavy bank clouds to the S. W. and W.S.W.; reduced sails to main lower topsail, when the ship would not run, lay to on Port Tack. The wind increased to a hurricane and the barometer fell to 27·98 with tremendous sea. The ship was hove down with her topsail yards 30 feet in the sea, ballast all shifted down to the starboard side. She lay in this position for seven days, and drifted to latitude 36° 30′ S. Long. 51° 50′ E. On the 5th June we were able to go below to trim ballast, lost boats and many sails. A large ship passed close to, with topmasts gone and the remnant of a foresail hanging from the foreyard.

According to the above report, the centre passed over the ship, which must have taken a severe list, judging from the amount her topsail yards were submerged.

HURRICANES

TABLE

This table gives the approximate Dates and Localities of Hurricanes

DATES.	LOCALITIES.				VESSELS BY WHICH EXPERIENCED.	WIND.	BARO
	LATITUDE.		LONGITUDE.				
	From	To	From	To		Direction.	Max. force. (Beaufort.)
Jan.							
8	33° S.	3° S.	57° E.	87° E.	Maile	N.	9
10	43° ,,	3° ,,	9° ,,	87° ,,	Norwester	N. W., W.N.W. ...	8
12-17	6° ,,	14° ,,	90° ,,	88° ,,	Camelot	S.E., S.W., W.S.W., W. to N.	9
13-15	10° ,,	18° ,,	56° ,,	50° ,,	Invertay, Alert and at Tamatave.	N.E., N., N.W.	9
18-21	28° ,,	39° ,,	41° ,,	46° ,,	S.S. River Mersey, Norwester.	E.N.E., W.N.W., W. ..	9
24	37° ,,	...	39° ,,	...	Harrington	N.N.W., N.W., S.W. ...	8
Feb. 6&7	21° S.	22° S.	49° E.	50° E.	S.S. Gladiator	E.N.E to N.	10
9-14	12° ,,	25° ,,	62° ,,	52° ,,	Evelina, Darwin, Centre Amerique, Goldenfleece, etc.	S., S. E., E., N. E., N., N.W.	12
12-14	39° ,,	41° ,,	23° ,,	48° ,,	County of Kinross, Aconcagua.	S.W., W., N.N.W. ...	9
19-22	26° ,,	28° ,,	46° ,,	50° ,,	Alsace Lorraine, S. S. Gladiator.	N.W., N.N.W., E.N.E. ...	9
23-27	13° ,,	22° ,,	66° ,,	54° ,,	William Turner, Lorna Doone, Alert.	All points	12
Mar. 2&5	35° S.	40° S.	37° E.	66° E.	Fleur de Marie, Louis Eugene, Leander, etc.	S., S.W., W.S.W., W., N.N.W.	9
14-16	39° ,,	41° ,,	10° ,,	21° ,,	Oaklands	W.N.W., N.W. by W....	8
22	41° ,,	...	18° ,,	...	Sierra Estrella	W.N.W., W.	8
April 21&22	25° S.	26° S.	43° E.	40° E.	S.S. Alboin	E.S.E., S.E.	8
22-24	37° ,,	38° ,,	8° ,,	10° ,,	Carl Burchard	S., S. by W.	10
27&28	30° ,,	32° ,,	54° ,,	57° ,,	Miako	N.E., N., N.W., W.S.W., S.	9
25-30	14° ,,	24° ,,	60° ,,	66° ,,	S.S. Dunrobin Castle, Nermirna, St. Vincent, Lady Harewood, etc.	All points	12

AND GALES.

IV.

and Gales in the Indian Ocean in 1892.

METER.		REMARKS.	MAURITIUS.					
			BAROMETER.		THERMOMETER.		WIND.	
Highest.	Lowest.		Highest.	Lowest.	Highest.	Lowest.	Direction.	Max. Velocity per Hour.
Inches.	Inches.		Inches.	Inches.	Deg.	Deg.		Miles.
30·00	29·80	Heavy gale	29·916	29·884	83·8	71·2	E. to E.N.E. ...	9·6
...	...	Heavy sea, thick rain.	29·891	...	84·6	72·6	E.S.E., East ...	16·0
...	...	Heavy sea, hard squalls and rain.	29·889	29·798	85·7	74·5	E.S.E., E., N. E., N., N.N.W., W. by N.	23·1
30·10	29·57	Cyclone very heavy, cross sea, heavy squalls and rain.	29·884	29·823	82·6	74·5	E.S.E., E., N.E. ...	22·0
...	...	High cross sea ...	30·034	29·796	84·5	72·7	W., S.S.E., var., S.E.	21·3
...	29·46	Sudden shift, heavy rain, thunder and lightning.	29·962	...	83·0	75·0	S.E. and East ...	12·4
29·90	...	Heavy seas, terrific squalls with thunder, lightning and rain.	29·947	29·921	83·1	76 0	E. to E.N.E. ...	17·1
30·03	28 90	Cyclone, terrific squalls, high cross sea and lightning.	29·884	29·354	83·4	73·2	E.S.E., E., N.E., N.N. E., N.	47·5
29·95	29·16	Strong gale, heavy high sea.	29·860	29·354	80·7	75·2	E N.E. and N. ...	47·5
30·04	28·96	Heavy gale, heavy sea.	29·962	29·797	84·4	71·1	E., N.W., S'ly. var.	11·4
30·04	28·74	Tremendous sea, heavy squalls.	29·861	29·607	85·4	74·0	S.E., E.N.E ...	29·1
29·96	29·04	Mountainous sea ...	29·822	29·727	83·7	73·0	E., N.E., N.W., W., W.S. W., S., E.S.E.	10·4
29·70	29·35	High cross sea ...	29·975	29·954	84·0	74·0	E., E. S. E., S. E....	17·9
...	...	Heavy squalls ...	30·014	...	82·8	74·2	E. S. E., E. ...	19·8
29·82	29·79	Fresh gale with high sea.	29·969	29·967	82·6	72·0	E. by S., S.E., E. N. E.	9·3
29·34	28·48	....	30·019	29·969	82·4	71·1	S.E., E.N.E., E. by S.	13·4
29·90	29·65	Sharp lightning, very heavy rain and squalls.	29·866	29·859	83·5	75·6	S.E., E., N.E. ...	19·7
30·14	27·93	Cyclone centre passed over Mauritius from north-westward.	29·994	27·956	83·5	72·4	S.E., E., N.E., N., N.W., W., S.W.	103·3

Approximate Dates and Localities of Hurricanes

DATES.	LOCALITIES.				VESSELS BY WHICH EXPERIENCED.	WIND.	BARO
	LATITUDE.		LONGITUDE.			Directions.	Max. force. Beaufort.
	From	To	From	To			
May 3-5	35° S.	41° S.	3° E.	25° E.	Bankville, County of Peebles, Merle.	E.S.E. to E.N.E. & S. to S. W.. W.&N. W. by W.	9
8&9	30° „	37° „	20° „	34° „	Merle, S.S. Dunrobin Castle.	S.S.W. to W.S.W. ...	9
17	40° „	...	9° „	...	Ariadne	N.W. to W.	9
27-29	38° „	37° S.	29° „	36° E.	Nancy	S.S.W., W., N.W, N. by W.	9
29-31	15° „	22° „	71° „	52° „	S.S. Invertay, Merle ..	S.E. by E., S.	9
30&31	43° „	...	16° „	...	Slamat	N.N.W., W.N.W. ...	9
30&31	15° N.	16° N.	72° „	71° E.	Lorna Doone	W.N.W., W., W. S.W.	8
June 1-6	39° S.	43° S.	23° E.	50° E.	Slamat, County of Selkirk, Warwickshire.	N.E., N., N.W., W., S. W. & back to N.	10
6-8	7° N.	11° N.	92° „	89° „	Sir Lancelot	S.W., S.W. by S., S.S.W.	8
8-12	13° S.	15° S.	57° „	56° „	Louis Alfred	E., E.S.E., S.E. ...	8
11&12	37° „	38° „	28° „	32° „	Karikal	W., W.N.W , W.S.W. ...	9
13-15	38° „	40° „	14° „	24° „	County of Roxburgh ...	N.W. by W., W.N. W., W.S.W., S.S. W.	11
18-20	35° „	38° „	38° „	50° „	Lock Vennacher, County of Roxburgh.	S.S.W., S., S.E. by S.	11
19-28	36° „	39° „	10° „	49° „	Janet Court	W.S.W. to N.N.W. ...	9
26-30	8° „	16° „	85° „	71° „	Sir Lancelot	S. S.E. to E.S.E. ...	9
July 3-6	13° N.	...	70° E.	...	Towy	W., W.S.W., S.W. by W.	9
14&15	34° S.	...	3° „	7° E.	Indian Empire	S.W.	8
27	17° N.	...	60° „	...	S. S. Ackbar	S.W.	9
Aug. 3	36° S.	...	49° E.	...	Indian Empire	S.S.W.	9
12-19	32° „	36° S.	15° „	31° E.	S. S. Kertigern, Sierra Estrella, Senior.	N., N.W., W., S.W. ...	10
25-27	37° „	40° „	18° „	...	Hartfield	S.E., E.S.E., E. ...	9
27-31	27° „	30° „	32° „	44° E.	S S. Dunrobin Castle, S. S. Arab.	E., E.N.E., N.E. ...	10
30&31	42° „	...	21° „	...	Ebenezer	N. to N.N.W.	9

and Gales in the Indian Ocean in 1892—(*contd.*).

METER.		REMARKS.	MAURITIUS.					
			BAROMETER.		THERMOMETER.		WIND.	
Highest.	Lowest.		Highest.	Lowest.	Highest.	Lowest.	Direction.	Max. Velocity per Hour.
Inches.	Inches.		Inches.	Inches.	Deg.	Deg.		
30·13	29·10	Terrific squalls, very heavy sea.	30·049	29·987	81·1	64·5	S., S.E., W. & calm.	13·9
30·18	29·85	Heavy high sea, fierce squalls.	30·123	30·062	79·4	66·0	S.E. to E. ...	18·7
...	...	Strong gale with very heavy sea.	30·085	...	82·3	69·3	S.E. to E. by S.	12·7
30·18	29·95	Heavy high sea and much rain.	30·097	30·089	79·0	64·2	S.E. by E. to E., N.E., S.-E'ly.	26·4
30·21	30·10	Terrible sea, heavy squalls and rain.	30·164	30·095	78·9	67·0	S.E., S.S. E.	26·4
...	29·21	Heavy rain	30·164	30·140	76·9	70·0	S. S. E. to S E.	23·1
29·80	29·75	Blowing a gale with lightning, thunder and rain.	30·164	30·140	76·9	70·0	S.S. E. to S.E.	23·1
30·12	28·11	Terrific gale, squalls of hurricane violence, tremendous cross sea.	30·120	30·096	78·3	69·6	S.E., E.S.E., E. by S.	26·3
29·80	29·71	Terrific squalls, heavy sea.	30·138	30·104	78·4	70·7	E.S.E., E. ...	23·3
30·12	29·92	Les vents soufflent avec violence, mer très grosse.	30·194	30·111	78·2	67·0	S.E., E. & S.E.	25·2
30·04	29·33	Coup de vent, mer très grosse.	30·194	30·154	76·3	67·0	S.E. ...	24·0
30·03	29·55	Cross sea, very heavy rain, squalls of force !!	30·118	30·074	77·4	65·0	E.S.E. to E. N. E.	19·3
30·25	28·80	Lost bulwarks, sails, masts, etc., thunder, vivid lightning and rain.	30·088	29·968	77·6	64·5	S. E, E., N. E., N., N.W., S'ly., W.	16·6
29·80	29·60	Lost bulwarks, and heavy rain, thunder and lightning terrific squalls.	30·214	29·968	77·4	64·5	E.S.E., N., N. W., S'ly., W., E.S.E'ly.	27·0
30·00	29·78	Violent squalls, mountainous sea.	30·190	30-121	76·4	65·0	E.S.E., E. ..	25·2
29·60	29·48	Heavy cross sea	30·161	30·112	76·0	63·1	E.S.E., S.E ...	26·3
30·35	30·30	Violent squalls, high confused sea.	30·249	30·241	74·0	65·0	S.E.	25·6
29·60	29·48	Strong squalls	30·105	...	74·4	58·8	S E., E.N.E. ...	13·1
30·15	...	Violent squalls	30·105	...	75·2	65·2	E.S.E., E. ...	16·3
30·20	29·45	Very heavy sea, violent squalls.	30·205	30·159	76·5	63·2	E.S.E., E. ...	23·4
30·25	29·75	Terrific hail and rain squalls.	30·130	30·104	76·0	64·8	E., E.N.E. ...	22·2
30·35	30·15	Constant rain, high sea, hard squalls.	30·219	30·119	76·0	62·4	E.S.E., S. S.E.	26·9
30·30	30·20	Very heavy sea	30·219	30·167	73·3	65·0	S.S.E. & S.E.	26·9

Approximate Dates and Localities of Hurricanes

DATES.	LOCALITIES.				VESSELS BY WHICH EXPERIENCED.	WIND.	BARO
	Latitude.		Longitude.				
	From	To	From	To		Direction	Max. force, Beaufort.
Sept. 2-5	38° S.	...	4° E.	7° E.	Houghton Tower ...	E. by S., S.S. W., W., N. W. by W. & S.W.	11
5 & 6	38° „	40° S.	49 „	52° „	Hartfield	N., N.W., W.N.W. ..	9
9-15	28° „	38° „	10 „	46° „	Houghton Tower, S.S. Downe Castle, Greyhound.	S., S.W., W., N.W., N.	9
13	42° „	...	11 „	...	Queen Elizabeth ...	N.W. to W.	8
22-29	35° „	42° S.	16° „	23° E.	Greyhound, Calcutta ...	N., N.N.W., W., S.W.	8
27-30	38° „	41° „	42° ,,	51° „	County of Dumfries ...	N.N.W.	8
Oct. 2 & 3	32° S.	41° S.	43° E.	59° E.	County of Dumfries, Glencoyn, Calcutta.	N.N.W., W., S.W. ...	10
5		Algoa Bay.			S.S. Clan McDonald...	N.W., W., W.S.W. ...	9
15	12° N.	...	85° E.	...	Champion	N., N.W.	9
17-20	34° S.	35° S.	17° „	18° E.	Greyhound	S.S.W., S., S.E. by S.	9
17 & 18	15° „	16° „	86° „	...	Calcutta	E.S.E., S.E., S.E. by S....	11
21-26	42° „	43° „	56 „	72° E.	Fort Glasgow	N., shift to S.W., W., W.N.W. & S.W.	9
28-31	34 „	36° „	21° „	22° „	Greyhound	W., W.N.W.	9
Nov. 4-6	35° S.	39° S.	20° E.	26° E	County of Caithness, Greyhound.	N.W. by N., N.W., W., W.S.W.	
9 & 10	39° „	...	42° „	46° „	County of Caithness ...	N.N.E., N., N.N.W., W.N.W.	10
9	36° N.	...	24° ,,	...	S.S. Abydos	N. E.	8
18	37° S.	...	120° ,,	...	S.S. Titus	W.	9
20-30	33° „	36° S.	16° „	27° E.	Greyhound	S.S.W., S., N.W., N. W. by W.	9
Dec. 21	34° S.	...	48° E.	...	Hutchings	E., E.S.E., backing to N. & W.	9
28-31	30° „	41° S.	12° „	20° E.	S.S. Conway Castle, Banklands.	N., W.N.W. & S.S.E., S., S.S.W.	9

and Gales in the Indian Ocean in 1892—(*contd.*)

METER.		REMARKS.	MAURITIUS.					
			BAROMETER.		THERMOMETER.		WIND.	
Highest.	Lowest.		Highest.	Lowest.	Highest.	Lowest.	Direction.	Max. Velocity per Hour.
Inches.	Inches.		Inches.	Inches	Deg.	Deg.		
30·34	30·20	Rain, terrific cross sea, sails carried away.	30·212	30·164	75·4	61·1	S.E., E.S.E. ...	25·1
29·90	29·75	Strong gale, high sea.	30·240	30·212	74·4	64·0	S. Ely.	22·3
30·53	30·47	Very heavy cross sea, hard squalls with rain and lightning.	30·258	30·208	76·3	65·1	E.S.E., E. ...	27·8
00·00	00·00	Heavy gale	30·208	...	75·9	66·1	E.S.E. to E. ...	20·7
29·65	29·30	Hard gale, severe squalls, terrific sea much lightning.	30·260	30·168	76·4	62·0	E.S.E., E. ...	26·5
30·10	29·40	Hard squalls, dense fog	30·260	30·180	76·0	65·1	E.S.E. to E. ..	26·5
30·50	29·20	Sudden shift to S.W., furious gale, tremendous high sea.	30·195	30·186	77·4	65·5	E.S.E., E. ...	16·6
27·72	29·64	High sea and heavy rain.	30·068	...	77·0	62·0	S.E. by S., N.E., N., N.W., W., S. by W.	7·4
29·95	29·80	Much lightning ..	30·202	...	77·1	68·0	E.S.E.	28·4
30·10	29·80	Strong gale, tremendous high sea, lightning and thunder.	30·175	30·101	79·0	66·1	E.S.E., E. ...	22·8
29·90	29·76	Blowing a storm, mountainous sea, lost bulwarks.	30·169	30·101	79·0	66·1	S.E. by E. to E. ...	22·8
29·90	29·38	Blowing with great fury, heavy cross sea	30·111	30·004	81·0	61·0	S.S.E. to E., E.N.E.	21·6
30·09	30·00	Strong gale, tremendous high sea.	30·049	30·033	79·5	65·2	From S.S.E. to N. N.W. & W.	12·2
30·00	29·67	Violent squalls, much rain.	30·102	30·026	82·4	68·1	E.S.E. to E.N.E.	18·5
...	...	Squalls of hurricane-force, incessant lightning.	30·105	30·092	81·3	67·0	S.E. to E.	20·3
...	...	High sea	30·105	...	81·0	67·0	S.E. to E.	19·7
29·53	29·10	Strong gale, high cross sea and rain.	30·024	...	82·5	65·0	E.S.E. to E. ...	17·8
30·00	29·00	Thunder, lightning and rain.	30·043	29·870	84·4	66·6	S. E. by E., E., N. E., N.N.W., W. by. S.W.-var & E.S.E. to N.E.	17·1
...	...	Strong gale, with high sea and rain.	30·055	...	83·1	68·7	S. E. by E. to E. by N.	15·8
30·12	29·15	High confused sea ...	30·059	30·033	84·0	72·3	E.S.E. to E. by N.	20·0

OFFICIAL REPORT OF NATURE OF DAMAGE SUSTAINED IN CYCLONE OF THE 29TH APRIL 1892, PUBLISHED 23RD MAY 1892.

"Aconcagua," 457 tons, British.—Parted moorings, driven ashore and making water, hull sustained damage.

"Amaranthe," 1,753 tons, British.—Dragged her moorings, grounded in 8 feet of water.

"Alsace et Loraine," 689 tons, French.—Parted moorings, driven on the bank close to the western cemetery, will probably be a total wreck.

"Ambulant," 507 tons, British.—Parted her moorings, her quarter smashed.

"Clavis," British.—Driven from her moorings by the colliding of the "Inverlay" and "Oaklands," grounded bow in 3 feet of water, stern in 9 feet, floated off on the 10th instant, bulwarks steering gear damaged, blade of propellor broken off.

"Eurydice," 1,465 tons, British.—Dragged her moorings and driven ashore, sustained slight damage.

"Evelina," 47 tons, British.—Will probably become a total wreck, having parted her moorings, driven ashore and crushed between the Tug steamer "Stella" and Port Office shed.

"Fleur de Marie," 240 tons, French.—Bowsprit, foretop-mast and foretop-gallant-mast carried away.

"Gladiator," 422 tons, British.—Parted her moorings, grounded on the patent slip, plates on the starboard side stove in two places.

"Greyhound," 187 tons, British.—Slight damage to stern.

"G. M. Tucker," 499 tons, British.—Parted her moorings, grounded in 6 feet water near Fort George Causeway, stern stove in, bowsprit gone, mizentop-mast and rigging carried away, and sundry other damage.

"Invertay," 828 tons, British.—Parted her moorings, was driven against the Government steamers "Stella" and "Clavis," grounded, floated again after being lightened, is in the Dry Dock for repairs.

"John Davie," 1,013 tons, British.—Parted her moorings, grounded near the Mariners' Church, hull damaged.

"Leander," 848 tons, British.—Dragged her stern moorings, grounded in 11 feet of water, stern, stove in gangway cut down to waterways, mizen mast damaged, 1 boat smashed, not leaky, will float when lightened.

"Normandy," 446 tons, British.—Parted her moorings, grounded on the N. E. side of the Albion Dock, has been floated.

"Oaklands," 999 tons, British.—Parted her moorings and was driven across the bank to the Railway bridge at the head of the Albion Dock, fouling several vessels on her way there, port quarter stove in, port bulwarks badly chafed, plates near the forerigging stove in, cathead gone, ship making water, steering gear and sails damaged.

"Paula," 284 tons, German.—Rudder damaged, bulwarks chafed, rails stove on port side.

"Prinses Welhelmina," 370 tons, Dutch.—Rails and bitts damaged, planking badly chafed.

"Pentakota," 2,209 tons, British.—Parted her head moorings, grounded forward, floated again the next day, hauling chocks, rails on the portside and bitts damaged, 2 boats lost, steering gear damaged.

"Queen of Scots," 1,373 tons, British.—Dragged her moorings and grounded in 9 feet of water, rigging strained and other damages, floated on the 20th instant.

"Rusole," 39 tons, British.—Dragged moorings, grounded at Parca Boulets quay, has been floated.

"Rio Loge," 241 tons, British.—Parted her stern moorings, stern stove in by collision, bulwarks broken.

"Strathspey," 316 tons, British.—Parted her cables, grounded in 7 feet of water near Fort George Causeway, bulwarks stove on starboard side, sails lost, leaking a little, floated and removed.

"Sierra Parema" 1,480 tons, British.—Dragged her moorings grounded in 12 feet of water, mizen top-mast, top-galant rigging gone, cat-head and stern bitts gone, 1 boat lost and other damage sustained, will float when lightened.

"Stella, British."—Driven from her moorings by the colliding of the "Invertay" and "Oaklands," grounded on the Port Office, patent slip, bow in 6 inches of water, stern in 11 feet bulwarks damaged, boat smashed, davits bent, &c.

"Susanne," 252 tons, British.—Parted her moorings, carried away chain plates, and forerigging stern smashed.

T. S. "Skolfield," 1,395 tons, American.—Parted moorings, carried away stern sail and hauling chocks and bitts, grounded in 6 feet of water alongside Fort George Causeway, lost spanker boom and mizen masthead, jibboom, foretopsail yard bobstay, making no water.

"Theresa Cosulich," 452 tons, Austrian.—Parted her starboard moorings by collision, swung round on the landing place, broke the columns of the Customs shed, stove in two plates on the port side, carried away topmast, main yard and stern rail.

"Crown of Liverpool," 286 tons, British.—Parted her moorings, driven on Port Office wharf, sunk several mooring lighters, smashed the Port Office crane, carried away her bulwarks on the port side and also her cut water.

"Umballa," 1,242 tons, British.—Dragged her anchors and grounded in 6 feet water, lost 4 davits, 2 boats, one plate in counter stove in, floated again after lightening.

"Vellore," 1,631 tons, British.—Dragged her moorings and grounded in 14 feet of water, steering gear and rudder damaged, starboard quarter pipes carried away, part of bulwarks smashed.

"William Wilson," 400 tons, British.—Parted her moorings, drifted on the Port Office wharf, damaged the quay and herself, bulwarks smashed, stern pipes carried away, topsail yard broken, is afloat and removed.

CHAPTER XI.

BRIEF HISTORY OF CYCLONES.

THIS chapter is based on my own personal experience, Dr. Meldrum's Advice, and translations from Capitaine Bridet's work on cyclones. The former name is well-known throughout the world; the latter is perhaps little known to most English navigators.

Mons. Bridet was a lieutenant in the French Navy. He was wrecked on the coast of Mozambique in a cyclone on the 1st April 1858 in the State schooner "L'Eglé." He afterwards became Capitaine de Port of St. Denis, Réunion Island, and held that post for about a quarter of a century and died three years ago. During his long term of office he devoted most of his time in studying cyclones in the Indian Ocean; for this, he was promoted to the rank of Capitaine de Frégate. He and Mr. Meldrum are the only two individuals who resided in this stormy region who took deep interest in this important theory. French navigators believe in Bridet. The few translations I have been able to obtain may be of service to those who have to navigate this much-dreaded locality.

In examining the table of record of cyclones printed in Log Books for the South Indian Ocean and Mauritius, June, July and August are exempt; but from the report of the ship "Dovenby Hall" already mentioned, one cyclone can be credited to June. As the table now stands, it is misleading. For November four cyclones are recorded; a fifth can now be added, as will be gleaned from my own experience.

When in command of the clipper ship that forms the frontispiece of this book, I sailed from Bombay on the 21st October 1893, and experienced fine weather down the Malabar Coast. On entering the N. W. monsoon regions, it became squally with incessant showers of rain for days, and, on the morning of the 1st November, ran into a cyclone right hand semi-circle in Lat. 9° 10′ S., Long. 72° 20′ E. The wind was steady at N. W. during the night, with hard squalls and very heavy rain. At midnight, reduced sails to topsails and foresail, at 5 A.M. the wind shifted from N. W. to N., and at 6 o'clock it was N. E. with mountainous seas. I immediately lay-to under the lower topsails, at 7 the wind rapidly veered to E., S. E., S., and into S. W., where it remained steady and blew a hurricane of much violence. Sails were blown from the yards, the lee-side under water up to the hatches, bulwarks washed away nearly the whole length of the ship, wheel broken into matchwood, skylight stove in and cabin flooded. The squalls were terrific. At 10 P.M. it showed signs of abating. By midnight the storm had passed, the wind shifted to N. W., when storm sails were set to keep the vessels head on to the sea. This cyclone gave warning days before, for when in 4° S. unusual high mountainous seas were encountered rolling up from an easterly direction. The weather was fine, and being so near the Equator, and November not considered a regular cyclonic month, no serious notice was taken of the sea, which was the chief indication on this occasion; and even, when I did lay-to on the morning of the 1st November, I had no anticipation of a regular cyclone. My impression at the time was, that it was a slight disturbance on the confluence of the N. W. monsoon and S. E. trade. On the other hand, I have no reliable barometer. My aneroid went out of order at Bombay, I could not replace it by a new one, and sailed with the full expectation of reaching Mauritius before the cyclone season set in. On my arrival, some almost doubted the occurrence, but the damaged condition of my ship was a striking proof of the authenticity of my statement; a true photograph confirmed all. Before clearing up the wreckage aloft and on deck I fixed my camera and took a forward view which is here given. Perhaps that is the first time a true picture has been obtained of a vessel immediately after one of these dreadful meteor. Dr. Meldrum wrote to all masters of vessels that left Mauritius in October for various places to try and gain more information of this cyclone, but as none were bound to or near the locality, no other information could be obtained beyond my report, which was read at a meeting of the Meteorological Society of Mauritius.

The only record we have of a cyclone north and west of this, and at an earlier date, is that which visited the Seychelles group thirty-five years ago. The few interesting particulars are translated from Bridet. On the 11th October 1862 the steamer "Nepaul," Captain Carling, on a voyage from Réunion to Seychelles, at noon, was in Lat. 5° 32′ S., Long. 54° 15′ E., or about 80 miles from Mahé, one of the Seychelles Islands, when she encountered a cyclone. The weather was threatening since the preceding day with sinister aspect. The wind blew in sudden gusts from S. E. to E. S. E., with high tempestuous sea, and the barometer fell to 29·83; the course was set S. E. so as not to approach the land during the tempestuous foul weather, all the afternoon was bad, the sea sweeping the deck carried away the starboard boat. A diluvian rainfall flooded the vessel, she had to suffer violent gusts of wind, veering E. and E. N. E., the barometer falling progressively. On the 12th at 3 A.M. it stood at 29·41. Towards daylight it began to take off, and at noon the wind and sea had gone down considerably. During that time Mahé Island was devastated by a terrible hurricane. On the 11th at noon the barometer was 29·95. A flood, caused by abundant rain, accompanied the wind, which blew from south in sudden gusts all the night. It increased violently from S. W. to W. and N. W. until the 12th, when at noon on that day the barometer fell to 29·71. Towards the afternoon it gradually rose, the wind and sea went down, and the weather became fine. Here is a cyclone perfectly characteristic of a small diameter; the centre passing between the steamer "Nepaul" and Mahé Island. The inhabitants suffered much from this dreadful meteor. An alarming landslip took place. A part of a mountain predominant over the town slipped, and houses and plantations were buried under several thousand tons of mud and stones. The cocoanut plantations were devastated. Utter ruin and famine took possession of a country that never up to that date had to suffer such a dire catastrophe. In the above, no mention is made of the shipping in Port Victoria. H. M. S. "Orestes" was in harbour and rode out with two anchors and engines moving full speed ahead. Her Blue Jackets rendered great aid to the inhabitants in clearing the *débris*. She, shortly after, sailed for Mauritius with the news. Government was prompt in sending assistance to the unfortunate Islanders. An American whaler was also in harbour. She dragged her anchors, stranded on the reefs, but was afterwards floated.

To return to the November cyclone. During the whole time the cyclone lasted I was on deck, from 4 o'clock in the morning until the storm abated. Under prevailing circumstances, books and charts were useless to me, they could not under any account be consulted. It was then that I felt the need of a more solid companion, and this caused me to turn my attention from paper that can only be used when the weather is fine. I had planned a cyclone compass, had it made of brass, and this valuable auxiliary now forms part of my navigating kit. It can be used on deck in all weathers without being damaged. The select few who saw it admired its simplicity and advised me to have it patented which I contemplate doing soon.

A second cyclone worthy of attention was encountered between Rodrigues and Mauritius. Left Calcutta on the 20th December 1894 for Mauritius. On the 12th January 1895, whilst running with fresh S. E. trade and approaching Rodrigues to sight it, the sun and moon were surrounded by halos, and this phenomenon continued till the night of the 13th, the position then being 50 miles north of Rodrigues. It grew squally, with heavy rain, after midnight. On the morning of the 14th Mauritius was W. by S., 180 miles; the weather then became very thick. I knew that a cyclone lay in the locality. Running for to anchor at the Bell Buoy, a dangerous roadstead, and having to put to sea should the cyclone strike the Island, was not considered advisable. I decided to lay-to, set my cyclone compass, and watch the wind and barometer. It continued to rain throughout the day and night, wind steady from S. E., moderate in force and barometer steady. On the morning of the 15th conditions were the same. At 11 o'clock the sun shone out brightly, and continued so for half an hour. I then anticipated some improvement, but would not act until the barometer indicated a change for good or bad. At noon conditions were anything but promising. It now became evident that I was in front of an advancing revolving storm. The barometer began to fall rapidly, mountainous seas rolling up from about N. E., with increasing S. E. wind. I then set the various parts of my cyclone compass and saw that I was on the south-west margin of the storm, and also in the dangerous quadrant. I considered it was now time to act quickly and seriously. Having a fast ship I decided to take my chance and run across the tract into the navigable quadrant. The two lower topsails were then set and ship headed towards N. W., making 9 knots by patent log and perhaps 11 over the ground. Before the helm was put up two oil bags were placed over each bow and the same over each quarter, and she ran comfortably, although the sea was dreadful to behold. At 4 P.M. the wind showed signs of shifting, barometer still going down. At sunset it veered from S. E. to a little west of south as near as could be judged, shipped much water amidship, but no damage, oil bags working faithfully, and replenished as required. I took in the fore lower topsail before it became dark and made up my mind to sacrifice the main one. At 8 o'clock the wind was S. S. W. at 10 S. W., the main topsail then blew to ribbons, ran under bare poles until midnight when the wind veered to west. At 2 A.M. on the 16th it was W. N. W., when the barometer then stopped falling at 29·30. Between 2 and 5 A.M. it blew a terrific gale, took large quantities of water over the stern as she was then on the wrong tack for bowing the sea. To avoid sustaining any damage and to assist the four oil bags, I placed another larger oil bag in a rattan ballast basket, attached the deep sea lead line to it, and ran it out the full length. The basket, which steamed away to windward, served the purpose, as the sea broke lightly after wards. At 6 o'clock the wind veered to N. W., the barometer rose, wind and sea went down, and the weather became finer. The "Sir Lancelot" escaped, with a good shaking up, and the loss of the main topsail only. Her fate was, however, unfortunately sealed in the same year, probably due to a cyclone in the Bay of Bengal when in command of an Arab. Running round a revolving storm is never advocated, only in extreme cases. I considered mine as such when I began the attempt. Now, let me cast a glance at my position when the barometer began to fall at noon on the 15th and when it stopped falling on the morning of the following day. To arrive at anything near the truth I must quote Mons. Bridet and bring his tables to bear on the subject. In doing so a whole chapter must be translated, and the said translation is about the best I could obtain.

Bridet.

Measure of the distance to the centre by the height of the barometer. Shall we be more lucky with the barometer, and shall we arrive at a close precision by the observation of that instrument of so perfect correctness when it is the question to measure the altitude of mountains. Although the barometer does not measure the more or less violence of the wind, but the more or less pressure of the atmospheric air, yet we know that hurricanes cause the barometer to fall, the more so when they are violent. It is evident enough that if all the cyclones were of an equal intensity and offered the same diminution of pressure of the air to the centre, the barometer would fall, for all, to the same point, and one would then see, from the circumference to the centre, a progressive fall, constantly the same; but we know now that, if all the hurricanes are cyclones, it is certain that all the cyclones are not hurricanes.

One, the centre of which passed over Réunion in 1859, and which we have previously reported, caused the barometer to fall to the minimum of 749 millimeters (29·49), whilst that of 1818 caused the barometer in Mauritius to fall 710 millimeters, equivalent to nearly 27·95.

From this it is easily understood that a cyclone of a large diameter, which would not in totality cause a fall of the barometer more than any other cyclone of a less dimension, will nevertheless influence that instrument far before the latter. The absolute height of the barometer cannot therefore give the exact distance to which one is from the centre, and the same reason prevented us cherishing hopes of obtaining the same result by the barometer. Yet one must not despair of the future. Later and more numerous and well-conducted observations will no doubt allow us to arrive at more satisfactory conclusions, and navigators will be supplied with some certainty on that much-important point; it is therefore towards that side that the investigations of observers must be directed, and especially those of navigators who will, without difficulty, understand of what important interest the signs of a barometer are.

Curves omitted: tables inserted.

I could have described a great number of barometric curves for hurricanes observed with precision at Réunion as well as in Mauritius, but I shall confine myself in sketching, without taking into account the oscillations, the curves that have been made by the hurricanes of 1818, 1859 and 1860. These will be sufficient to give an idea of the manner in which the barometer varies according to the diameter of the hurricane, whether of small or great dimension, and whether the meteor is of more or less considerable violence.

One can thus satisfy himself of the influence of hurricanes over the barometer and see that a same barometric height shows different distances from the centre, although the minimum had been almost the same for the cyclones of 1818 and 1860. I have therefore drawn up the following table :—

TABLE I.

Height of Barometer.		Distance of great diameter to the centre.		Distance of small diameter to the centre.		Mean distance to centre.	
French. mm.	English. Inches.	Miles.	Hours.	Miles.	Hours.	Miles.	Hours.
759·0	29·89	540	72	270	36	405	54
758·5	29·87	493	66	247	33	375	49
758·0	29·85	450	60	225	30	337	45
757·0	29·81	405	54	202	27	303	40
756·0	29·77	360	48	180	24	270	36
754·5	29·71	315	42	157	21	236	31
753·0	29·65	270	36	135	18	201	27
751·0	29·57	225	30	112	15	168	22
748·0	29·45	180	24	90	12	135	18
744·0	29·29	135	18	67	9	101	13
738·0	29·06	96	12	45	6	67	9
729·0	28·70	45	6	22	3	37	4
713·0	28·07	......	......	......	......	......	......

In a calculation of prevision, while uncertain whether the cyclone which is feared is of great or small diameter, it is well to refer to the column headed "Mean distance to the centre." There is thus great chance to be near enough the truth to decide on the work to perform.

Nevertheless the above table, which I have given, is a general sketch of what can be expected from a barometer during a hurricane, to be consulted but in presence of a real hurricane and not a cyclone and to be considered as a mere information. I must also add a restriction to its use; it is that it can only be used in tropical regions whilst the hurricane pursues the first branch of its course and not when it is in more elevated latitudes.

In spite of all these restrictions, or rather an account thereof, a seaman will find himself doubtless very perplexed if he consults that table with a view of gathering positive conclusions which might guide him in the work about to be performed; therefore, having been able to give but an imperfect approximation of the distance to the centre by the absolute height of the barometer, I have tried, by the study of a great number of hurricanes, to see if it was not possible to find out, more easily, that distance by the fall of the barometer in an interval of time.

I have observed that a hurricane is composed of a central newel in which the wind blows with great violence, and of a surrounding zone of more or less great extent, in the centre of which the wind still allows to work; it is the difference of the extent of that surrounding zone which renders the diameter of a hurricane more or less great.

The hurricane is, so to speak, a meteor enveloped by an atmosphere more or less developed, and that this is what explains that the barometric fall per hour can be about the same, from a certain time, where really the wind begins to blow with violence.

That central newel which really constitutes the hurricane, and during the passage of which take place all the disasters, is about 250 miles in diameter. Whatever may be the extreme limits which a hurricane reaches, the barometer falls in a marked and interrupted manner, at the very moment the real hurricane is declared ; the barometric disturbance, per hour, must be equal in character for all hurricanes, and a table can be drawn which will, perhaps, give a better estimation of the distance. Among the numerous signs shown by the barometer, it will be found that we are in the circle of activity of the serious hurricane when, at nearest, the force of the wind will not allow us to keep but the lower topsails and perhaps reefed foresail ; the centre of the hurricane is then estimated to be distant not more than 150 miles. I have therefore drawn up the following table embodying the barometric variations, which may be applied, almost equally, to hurricanes of large and small diameters:—

TABLE II.

Fall per hour.			Distance to the centre.
	MM.	Thousands of English Inches.	
Tenth of millemeters.	0·3	0·012	24 hours.
	0·5	0·020	21 „
	0·6	0·024	18 „
	0·7	0·028	15 „
Millemeters.	1·0	0.039	12 „
	1·5	0·060	9 „
	2·0	0·080	6 „
	3·0	0·120	3 „
	4·5	0·180	....

I must not omit to point out that the foregoing method of finding out the distance to the centre by the barometric fall per hour can only be used when one is on the passage to the centre or very close to its course ; if, on the contrary, one is somewhat far from it, the mean fall per hour is no more the same, and the distance cannot therefore be determined. Furthermore, this approximative valuation is sufficiently correct, but for a cyclone of extreme violence, it must be concluded that for information respecting the diameter of a hurricane or its distance from the centre the barometer furnishes but very incomplete data.

The only fact perfectly admitted up to now is that the minimum of the barometric height is always at the centre of the hurricane, and that, consequently, the barometer falls. the more as we advance nearer to the central point ; a very precious item of information for the navigator, who then knows at every moment if the cyclone is coming near again or driving away from the position it occupies.

A master must necessarily take into account in his calculations all these uncertainties and suppose he is always nearer the centre. than he believes himself to be. No inconvenience is occasioned in this supposition before performing any manœuvre whatever.

Taking into account all the restrictions set forth by Mons. Bridet in putting Table I. to practical use, and at the same time not forgetting the soundness of Dr. Meldrum's advice which I introduce below, I set my topsails and ran. I knew that I had a regular hurricane to do battle with, and not knowing anything about its diameter, I selected the mean distance to the centre from Table I. as an approximate guide. When the attempt was made, the barometer stood at 29·65, approximate distance from centre by table, 201 miles, or 27 hours. I knew what the "Sir Lancelot" could do under such short canvas, and that I stood a fair chance of travelling faster than the storm. By referring to the table and my cyclone compass, as the barometer fell and the wind shifted, I had a fair approximate knowledge of my whereabouts in the storm, and my anxiety of noon disappeared. When I had the foretop-sail furled, I could easily have hove-to, but as the barometer did not then fall so rapidly and the wind shifting so uniformly as we worked around the storm, I kept on. When the barometer stopped at 29·30 and the wind at W. N. W. the table was again consulted and showed the distance from the centre to be 101 miles, or 13 hours. Further information I gleaned from my cyclone compass, my companion on deck during the whole proceedings.

The next and last point of importance was the expected shift to N. W., when our task would be over.

In concluding this chapter I wish it to be distinctly understood that what I have stated above was not done with the object that others should be guided by my conduct. I would strongly recommend to those who have never been in one of these dreadful storms to always remember Piddington's advice, that all positive rules for manœuvring tend to mislead; every ship must have its own peculiar management depending on the four great elements of the problem, *viz.*, (1) the ship and her sea room, (2) the track of the cyclone, (3) its speed, and (4) the ship's run and drift, while on the part of the master caution and watchfulness are essentially requisite.

Dr. Meldrum's advice in respect to avoiding the centre of what is usually known as Mauritius cyclones are worthy of the serious attention of navigators:—

" A rotatory storm, in the Indian Ocean, not being a detached body of air whirling round in a circle beyond which light airs and variables prevail, but the result of the conflicting action of two antagonistic winds which often respectively extend hundreds of miles, north and south of the centre, towards which they at a distance begin to curve gradually, the degree of curvature increasing as the centre is approached, until at length they rush round it with more or less violence, it becomes a question of practical importance to know when the direction of the wind can be relied upon for a sufficiently near estimate of the bearing of the centre; for, by considering the direction of the wind, when it is S. E. for example, to be tangential to a storm circle and then running to the westward, with the view of crossing the storm's track, the vessel may be steered headlong to destruction.

" There does not appear to be much difficulty in avoiding a rotatory storm when the vessel is in its northern half and has the wind at any point from south to north through the west or even from south to north-east through the west.

" If the wind be between south and west, a vessel should run to the north-westward; if it be between west and north she should run to the north-eastward, and if it be from north-eastward, she should make as much easting as possible.

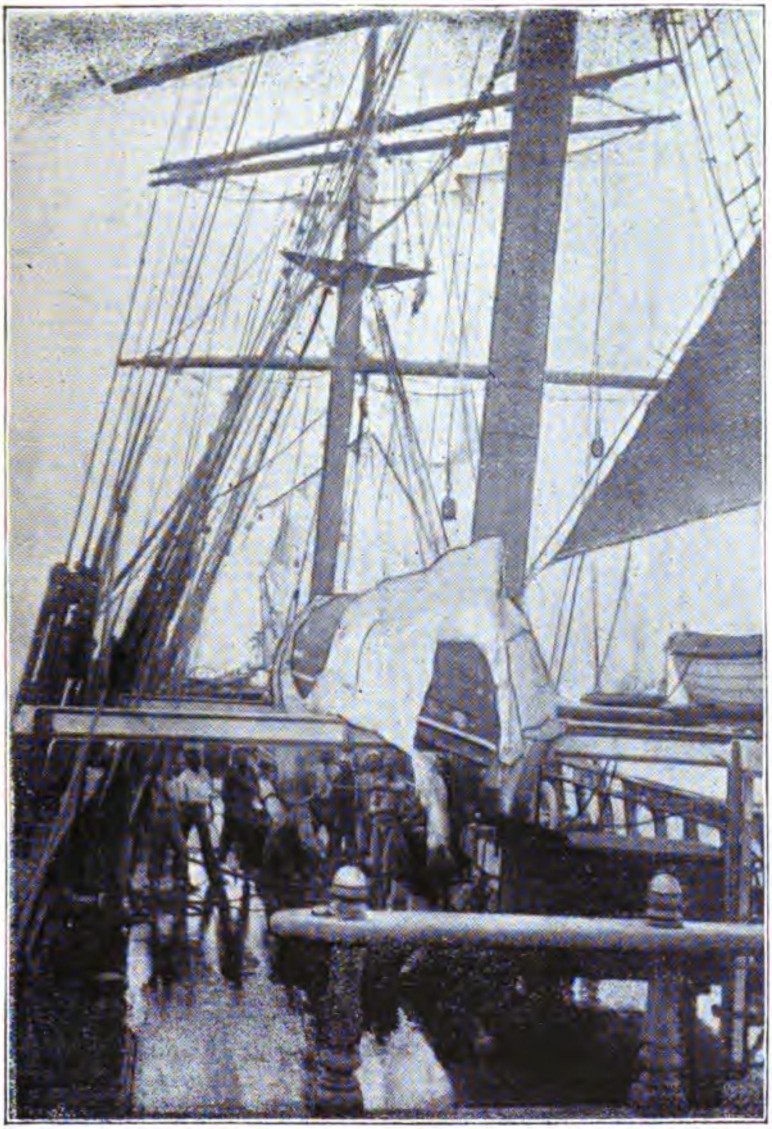
" Or if the sea and weather allowed, she might be hove-to on the proper tack till the barometer rose, and the weather improved, except, perhaps, when the wind is from N. E., in which case if she be between the parallels of 18° and 30° S., the storm may be travelling to the south-eastward, and bearing down upon her. If such should be its course, she should endeavour to cross its path by running to the south-westward."

[*N.B.*—Compare this exception with paragraph 6, where Dr. Meldrum, as the result of ten years' additional experience, advises " making as much easting as possible," instead of running to south-westward.]

" When, however, the wind is from any point from south to north by the west, there is really no danger whatever. All that is required is either to

SIR LANCELOT [illegible]

[illegible]



"SIR LANCELOT" AFTER A CYCLONE

1ST NOVEMBER, 1893.

stand away from the centre by going to the westward, the north-westward, the northward, the north-eastward or the eastward according to the direction of the wind, or to lie-to. It might easily be shown that all the homeward bound vessels that come here for repairs, in consequence of their having sustained damage in a cyclone which they entered from the north, incurred the heavy expenses and the long delay thus occasioned by running to the southward or south-westward, in place of heaving-to in time, or standing off till the barometer should rise and the weather improve. There is a strong temptation to such vessels to hold their course with a favourable breeze, but an increasing northerly or north-easterly wind with a falling barometer and bad appearance should warn them of the extreme danger of running to the south-westward at the rate of perhaps 9 knots an hour. Many vessels, by taking supposed advantage of these northerly winds, have got in front of a storm, been dismasted, and obliged to remain at Mauritius for months, whilst others have been condemned. A delay of 24 or 48 hours would almost in every instance have saved both vessel and cargo.

"On the other hand to vessels with the wind between south and east, or E. N. E., especially between S. S. E. and E., the case is widely different, for the storm is travelling towards some point between W. S. W. and S. E., and that point cannot always be known, because the wind may not, as yet, be blowing round the centre of the storm in a circle, although the barometer be falling and the wind increasing.

"To vessels in this situation the safest course seems to be to lie-to and carefully watch the wind and barometer.

"If the wind should haul decidedly, either to E. or S., the passage of the centre with respect to the vessel's position may be approximately inferred.

"When the barometer has fallen four-tenths of an inch, the direction of the wind may be taken to be nearly at right angles to the direction of the centre."

[*N.B.*—After ten years' further experience, a fall of six-tenths is considered necessary before the above conclusion can be drawn. (See para. 5 on next page.)]

"If the vessel should then have the wind from S. S. E., she should endeavour to run to the westward, so as to cross the storm's path. By running to the westward before the barometer has fallen more than a tenth or so, she may be approaching the centre of the storm, as the 'Louisa' was doing when she had the wind from the south-eastward on the 2nd February 1863.

"With the wind from the south-eastward, the same difficulty presents itself to vessels at anchor at the Bell Buoy (Mauritius) and at Réunion, namely, that of knowing the bearing of the centre, as at the outset the wind may be far from blowing at right angles to the direction of the centre. If the centre should bear north or N. N. W., in place of N. E., and the vessel run to the north-westward, she may, by keeping that course, get into the heart of the storm, as has frequently happened to vessels leaving St. Denis, and as probably happened to the 'Shah Allum,' after she left the Bell Buoy in January 1863.

"The best course would perhaps be (if the vessels cannot be brought into port) to put to sea on the first decisive indications of the coming storm, and, after obtaining sufficient sea room, to lie-to, watch the wind and barometer, and be guided by them, not hesitating to run to the westward or north-westward, if the barometer should have fallen three or four-tenths of an inch, with the wind between S. E. and S.; but if the wind should haul from S. E. to E. and N.E., taking care that the vessel be hove-to on the port tack, after getting as far to the eastward as possible."

"After ten years' further experience, we have little to add to what was said in 1863 :—

"(1). The really dangerous position for a vessel is with the wind from the north-eastward, to S. S. E., and more especially from the S. E.

"(2). When the wind is between N. E. and E. S. E., our advice would be to lie-to at once.

"(3). With the wind from the south-eastward and the barometer still high though falling, we would also heave-to, because, as yet, the bearing of the centre cannot be known. If the wind hauled decidedly to the southward, and passed to the south of S. S. E., we would stand to the north-westward without loss of time, but if it veered to the eastward we would either lie-to on the port tack, or endeavour to make easting.

"(4). On no account whatever would we run to the southward or south-westward with the wind anywhere between N. and E., but make as much easting as possible.

"(5). The most dangerous case of all is when the wind is steady from S. E., the barometer falling, and the wind gradually increasing in force. What is a vessel to do under these circumstances? If she runs to the N.W., she may be going straight to the centre. Upon the whole, we think she cannot do better than lie-to and watch the wind and barometer. The chances are that the wind will veer, and that she will know, before it is too late, whether it is best to run to the north-westward, to remain where she is, or to hold to the eastward. But if the wind does not veer, and the barometer has fallen from the commencement fully six-tenths of an inch, we would, as a last resort, run to the north-eastward if possible. We say six-tenths, because four-tenths, which was the amount of fall mentioned in 1863, is too small. (In the centre of a cyclone in these seas, the barometer always falls below 28 inches.)

"The above remarks apply chiefly to vessels encountering cyclones which have not yet commenced to curve to the southward and south-eastward.

"(6). When a storm is travelling to the southward or south-eastward, I would still, with the wind anywhere between north and east, make as much easting as possible, and not, as recommended in 1863, run to the south-westward, for we now know that the north-easterly and easterly winds often, if not always, blow towards the centre.

"(7). Storms do not always curve to the southward and south-eastward, and those that do so seldom proceed far in those directions. But if it was found that a storm was travelling to south or south-east a vessel with the wind from E. S. E. to S. should hold to the westward.

"It may be proper to remark that the modifications above mentioned, as the form of cyclones, do not very materially affect the general theory of revolving storms, as established by Redfield and Reid in America and the West Indies and by Piddington and Thom in Calcutta and Mauritius, although, I think, they deserve the attention of all interested in navigation. They are in some measure a compromise between Prof. Espy's views and those of the advocates of the circular theory."

Scale of velocities of wind.

Strong breeze	34 miles per hour.
Moderate gale	40 ,,
Fresh gale	48 ,,
Strong gale	56 ,,
Storm	75 ,,
Hurricane	90 and upwards.

Observations on two sides of a depression that took place at Mauritius between 4th and 7th February 1898 may be of use to vessels leaving Port Louis with the first fall of the barometer. They show to those who live in more favoured regions with what anxiety the inhabitants watched telegrams from the Observatory on the approach of a storm.

5th February (3 p.m.).

The following telegram was received to-day from the Observatory :—

" Centre of cyclone of depression to N. N. E. No danger at present. Will telegraph at 7 a.m. to-morrow."

6th February (7 a.m.).

The following telegrams were received yesterday and to-day from the Observatory :—

" Barometer 29·739, falling at the rate of 3 thousandths of an inch. Nord E. S. E. at the rate of 14 miles. Centre N. N. E.

" No danger at present, though centre of cyclone is nearer Mauritius than it was last evening. Will telegraph at 10 a.m."

6th February (10 a.m.).

" Barometer 29·727, falling at the rate of 9 thousandths of an inch per hour. E. S. E. at the rate of 9 miles. Centre N. N. E.

" The wind has commenced to back, if it continues to do so the centre will pass at a safe distance to eastward. Will telegraph at 3 p.m."

6th February (3 p.m.).

" Barometer 29·713. Stationary. Wind S. E. by E. at the rate of 13 miles.

" Centre N. N. E., will probably pass at a safe distance to eastward under present condition. Will telegraph at 6 p.m."

6th February (6 p.m.).

" Barometer 29·705, falling at the rate of 3 thousandths of an inch per hour. Wind S. E. by E. at the rate of 10 per hour. Centre N. N. E.

" No danger for to-night. Will telegraph at 6 a.m. to-morrow."

7th February (6 a.m.).

" Barometer 29·644, falling at the rate of 5 thousandths of an inch per hour. Wind S. E. by S. at the rate of 20 miles. Centre N. E. Depression passing at a safe distance eastward. Will telegraph at 10 a.m."

7th February (10 a.m.).

" Barometer 29·630 inches and falling at the rate of 5 thousandths of an inch per hour. Wind from S. S. E. at the rate of 25 miles per hour.

" Centre of cyclone or depression at E. N. E. Depression will pass to S. E. at a safe distance. Will telegraph at 3 p.m."

7th February (3 p.m.).

" Barometer 29·608, falling at the rate of 3 thousandths of an inch per hour. Wind S. S. E. at the rate of 14. Centre E. N. E. Conditions still favourable. Will telegraph at 6 a.m. to-morrow."

8TH FEBRUARY (6 A.M.).

"Barometer 29·588, and falling at the rate of 1 thousandth of an inch per hour. Wind from S. ½ E. at the rate of 15 miles. Centre eastward.

"Centre of depression probably passing near Rodrigues on a S. S. W. course. Will telegraph at 3 P.M."

8TH FEBRUARY (3 P.M.).

"Barometer 29·609, rising at the rate of 12 thousandths of an inch per hour.

"Wind S. S. E. to S. by W. at the rate of 18 miles per hour. Centre eastward.

"No more telegrams."

Barque "Grosvenor."

The barque "Grosvenor" sailed from Port Louis on the 4th February at 4 P.M. with falling barometer and every indication of a coming cyclone. In consulting Mons. Bridet's "Table of Distances from Storm's Centre" by the fall of the barometer within the tropics, I saw that I had ample time to run north and perhaps change the wind soon. After the pilot left, sails were set with this object in view. Towards midnight the S. E. squalls growing brisk with high beam seas, I reduced sails to topsails and courses. By noon of the 5th I had made good distance, 130 miles; wind still fresh at S. E., barometer 29·78, ship making 6 knots on a true north course. At 3 P.M. it dropped to a 3 knot breeze and gradually fell light. At 6 P.M. it backed to S. W. at 2 knots. Consulting my cyclone compass and finding that I was on the N.W. margin of the depression, I set my course to N. N. E.

On the 6th at 6 P.M., when distant 280 miles N. ½ E. from Port Louis, I had a brisk W. S. W. wind, barometer 29·74, rising. At 4 P.M. the barometer stood at 29·70, which was the lowest reading at ship.

At the same time the barometer at the Observatory was 29·705, falling at the rate given by Observatory telegrams. Wind S. E. by E., velocity 10 miles per hour, centre N. N. E., the course I was then steering nearly three hundred miles north of the island.

CHAPTER XII.

REMINISCENCES OF LOST VESSELS.

REMINISCENCES are always interesting and useful, and I append below a list of vessels lost in the Indian Ocean from fire, currents, and cyclones during the past thirty-eight years :—

"Shah Jehan."

This unfortunate ship sailed from Calcutta on the 25th May 1859 for Mauritius with a general cargo, 349 emigrants (about 410 souls), and a crew of about 75 men. All went well till noon of the 27th of June, when an alarm was raised that the ship was on fire. The "Shah Jehan" (825 tons) was at the time in Lat. 12° S. and Long. 75° E., Mauritius bearing W. S. W., 1,100 miles. The ship continued burning from noon of the 27th till noon of the 30th, at which latter time she was abandoned. After the boats left her she continued burning till 8 P.M., when the flames were no longer seen by those in the boats, the vessel having doubtless sunk. Out of nearly 500 souls that were on board previous to the outbreak of fire 64 only were saved in two boats, the launch and the gig. Out of these 64, only one was an emigrant. The third officer, doctor, gunner, and about 12 of the crew, with at least 60 or 70 coolies were drowned by the swamping of the cutter and jolly boat. About 200 to 250 coolies were set adrift on three rafts, the remainder perished either on board the ill-fated vessel or were drowned alongside. This was the evidence given by the master and fully corroborated by the chief and second mates, and on the whole tragical affair the Marine Board of Mauritius passed the following remarks :—

"It is difficult, on learning for the first time that of all the people saved in the launch one only was an emigrant, to divest oneself of a certain painful suspicion that the master, officers, and crew must have rather exerted themselves for the preservation of their own lives than in doing their duty with regard to the unfortunate coolies ; but when it is discovered in the course of examination that during nearly three days and nights every effort was made not only to extinguish the fire, but to provide for the safety of all on board in the event of an abandonment becoming unavoidable, suspicion gives place to a feeling of admiration at the coolness, courage, and perseverance displayed by the master, and those under his orders, in a situation of peculiar peril and difficulty from the moment the alarm was first given to the hour it became necessary to abandon the vessel, and with the exception of some 30 unfortunate wretches paralysed by fear, the master, mate and crew were the very last that left her. The whole proceedings are, in the opinion of the Board, marked by great judgment, prudence, and forethought."

The rafts were constructed of spare-topmasts, topgallant-masts, jibboom, driver-gaff and boom, studding sail booms, and yards. All the hencoops, the long boats cover—in fact, everything capable of floating that could be made available for the purpose of saving life, was used for these rafts, which were firmly lashed together with small running rigging unrove for that purpose. In this way every officer and crew was occupied from the 27th to the 30th, having at the time but little food, and being almost entirely without water.

Two boats of the "Shah Jehan" with their 64 passengers shaped a course for Mauritius. As the master had saved instruments and charts, he was enabled to ascertain with correctness the distance run, and at the time the "Vasco de Gama" fell in with and picked them up, they were three hundred miles from the spot where the "Shah Jehan" had been abandoned five days previously. It was remarked at the time that it would have been more satisfactory had the "Vasco de Gama" turned to windward and passed near the spot where the coolies had been left, but considering that such a proceeding would have occupied four days, and probably more, and that for already seven days these unfortunates had been deprived of all nourishment, and exposed to the sun, wind and sea, it sounded incredible how they could have been found alive.

The letter of thanks from Governor William Stevenson to H. E. the Governor of Réunion on the occasion noted above is here given :—

Government House,
Mauritius, July 1859.

Monsieur le Gouverneur,—With reference to your Excellency's letter of the 15th instant, by which I have had the satisfaction to be apprized of the distinguished services rendered in the cause of humanity to the ship-wrecked captain and crew of the English barque "Shah Jehan" by the captain and crew of the French ship "Vasco de Gama," and have also learnt that on the arrival of these ship-wrecked British subjects at La Réunion your Excellency hastened to make their disaster an occasion for the exhibition of one of those acts of courtesy which the French and English Governments ever gladly interchanged by forwarding them to Mauritius on board a French sloop of war, I have the honor to request that your Excellency will present the thanks of the English Government to the captain and officers of the "Vasco de Gama" for having saved the lives of so many of the subjects of her Majesty the Queen of England on this occasion, and I beg, Monsieur le Baron, that your Excellency will accept my acknowledgments, on behalf of Her Majesty's Government, for the readiness with which your Excellency came to the relief of her Majesty's subjects in their distress, a circumstance which I shall not fail to bring to the notice of Her Majesty's Government by the earliest opportunity.

WM. STEVENSON,
Governor.

A Son Excellence Monsieur le Baron D'Arrican,
Gouverneur de la Réunion.

Thirty-eight years later, or in 1897, the Government and the entire inhabitants of Réunion rendered more distinguished services in the cause of humanity to 1,300 persons of the British transport "Warren Hastings" wrecked on their coast.

"Ruthenia."

The "Ruthenia" (211 tons) appears to have been in good seaworthy condition at the time of leaving Callao. The voyage was prosecuted with success till 12th February 1861, when, being in Lat. 24° 35′ S., Long. 55° 26′ E., a gale commenced at E. S. E., which gradually increased to a hurricane accompanied by a terrific sea. This severe weather lasted till the 18th, during which time the "Ruthenia" became leaky, and her decks swept, and continued making so much water that when the gale moderated, the master, fearing he could not keep the vessel afloat if he endeavoured to make for Mauritius, bore away for Réunion for the safety of the lives of all on board. He reached St. Denis roads on the 25th, one pump being choked by the guano, and the other kept continually going, the leak increasing, and no boat left to embark the crew in in the event of the abandonment of the vessel becoming necessary. When at St. Denis there was no possibility of lightening her, the weather being unsettled and the sea washing right over her; and on the 28th there being every appearance of bad weather, and the signal being made from the shore for the vessels in the road to be prepared to slip and proceed to sea, it was considered advisable to leave her for the night and take refuge on board other vessels. On the 1st March the master and crew returned on board and pumped her till 4 P.M., when she was abandoned with 4 feet water in the hold, the crew being taken away by the boats of the French barque "Claire," signalled to that effect by the Port Captain. On the 2nd and 3rd idem the weather continued unsettled, with the sea going right over the vessel, so that the hatches could not be taken off. She was again visited by the master, but nothing could be done either in the way of heaving cargo overboard or pumping, both pumps being useless. Under these circumstances she foundered at 6 A.M. on the 3rd March just after the master left her. The Marine Board considered that every exertion was made by the master, his officers and crew for the safety of the property committed to their charge; that their conduct was most exemplary in every respect; and that the abandonment of the vessel was only carried into effect when it was evident that nothing could be done.

The Marine Board commented as follows on the conduct of Captain A. Offret of His Imperial French Majesty's schooner of war "La Perle" on his rendering assistance to the ship "Alma" at danger to himself and his crew:—

Ship "Alma," 917 tons.

"On the morning of the 18th January 1861 when on a voyage from France to Réunion, he descried the 'Alma' in a disabled and sinking state. The gale was at its height, and the sea (as is represented by the master and officers of the 'Alma') was tremendous. Notwithstanding the danger of approaching a large and almost unmanageable vessel during such weather, he bore down to her assistance, and with coolness and presence of mind, well seconded by admirable seamanship, he succeeded in passing close under her lee-quarter, and established a communication by means of one of his boats. No sooner had two of the 'Alma's' crew descended into this boat, when a heavy sea capsized and almost destroyed her. One man (the second officer) clung to the wreck and was soon in safety on board 'La Perle,' but the other unfortunately drifted astern. Every exertion was made for the recovery of this poor fellow for the space of three hours, but to no avail. None but sailors can rightly appreciate the perseverance with which 'La Perle' was turned to windward, during a heavy gale, for the purpose of picking this man up, and although Mons. Offret was denied the pleasure of saving him, it must ever be a source of the deepest satisfaction to him to feel that nothing was left undone that was humanely possible. Having seen this unfortunate man sink exhausted, 'La Perle' bore up to rejoin the 'Alma' and found that during her brief absence she had settled down considerably in the water. Communication was again established by means of one of the 'Alma's' boats, and after much fatigue and considerable risk the whole of the remaining officers and crew were transferred from the sinking vessel to the schooner, where during their passage to Mauritius they received every kindness and attention from her gallant commander. Facts like these require no comment, they speak for themselves. Twenty-six British seamen rescued from inevitable death, for although there is no actual evidence of the foundering of the 'Alma,' there can be no doubt of it."

"Swithamley" wrecked by Current in 1861.

This vessel was bound from Bombay to Liverpool. She crossed the Equator in 78° 44′ Long. well to the eastward of the Chagos Archipelago. After crossing the line she experienced strong S. S. E. and S. E. winds, with thick rainy weather. On the 1st July good observations were obtained, which placed the vessel in Lat. 5° 28′ S., Long 73° 15′ E., from which it appeared that during three days there had been a considerable set to the westward. The wind being still very southerly, and it being evident that the vessel was not likely to weather Diego Garcia, at 20 minutes past noon on the above date the course was altered to the N. W. for the purpose of passing round the north end of the Chagos Archipelago, between Blenheim's shoal and the southern end of Speakers Bank. At this time the northern end of Blenheim's shoal bore W. by N. ¾ N., distant 45 miles. Having steered N. W. ½ W. 22′ till 4 P.M., sights were taken, and the vessel's position was Lat. 5° 4′ S., Long 72° 43′ E. The course was altered to N. W., at 7-30 to N. W. by W., at 7-40 to W. N. W., and at 8 P.M. to W. The weather at sunset was fine and clear; no signs of danger could be discovered from aloft. At 9 P.M. the vessel struck on about the centre of the eastern edge of Blenheim's reef, and soon became a wreck.

The Board considers the master justified in supposing his vessel well to the northward of Blenheim shoal at 8 P.M. when the course was altered to west, and presume that a strong S. S. E. or southerly current must have prevented her from making the amount of northing given by dead reckoning which was carefully verified. Supposing the latitude at noon to have been correct, it is difficult to come to any other conclusion. The history of this wreck confirms my late experience of the vagaries of currents in the vicinity of the Chagos mentioned in the chapter on currents.

The strong tides that almost invariably prevail in the immediate neighbourhood of the reefs and islets in these seas are known only to the fishermen and others who frequent them, but of their existence there is not the slightest doubt; the ocean currents are regulated by the prevailing winds (as stated by Horsburgh and others) and the "Swithamley" steered a more northerly course than was absolutely necessary under the conviction that there might be a westerly current prevailing.

"Lady Flora Hastings."

The "Lady Flora Hastings" (659 tons) was bound from Moulmein to Falmouth with teak timber. On the 2nd January 1862, being then in about 12° Lat. S. and 80° Long. E., at 10 A.M. it came on to blow hard from S. S. W., and about 2 P.M. suddenly fell calm, the sea having a boiling and most turbulent motion, being apparently the vortex of a forming cyclone, which caused the ship to strain very much and make a great deal of water. At about 3 P.M. the wind came from north and blew very hard; ran to the southward at night. Next morning weather finer, wind N. E., made sail. She then ran S. S. W., the wind gradually veering E. and S. E. until the 7th January, when the wind veered round to S. and S. S. W., blowing hard with threatening appearance. Being then in Lat. 20° S. and Long. 77° E., and believing another cyclone to be approaching from the eastward, ran away to the northward to keep out of its track. At 10 P.M. it blew hard from S. S. W., and continued so until 1 A.M. of the 8th, the vessel making more water than the pumps could keep free. She then broached too and became dismasted. At 6 A.M. the weather moderated, water gaining in the hold fast. At noon it was 10 feet, the ship becoming unmanageable. At 7 P.M. the hatches were forced up by the water, and the ship filled and was waterlogged, swimming very deep in the water. On the 10th January the crew were rescued by the French ship "Léonie." Being herself in a disabled condition from the same cyclone, she had but one available boat, which took the crew off the wreck in two trips. They were eventually landed at Mauritius on the 20th January.

"Alice Maud."

This is a remarkable case. The master's report and that of experts on the loss of the "Alice Maud" (435 tons) must be taken separately. The vessel ran into a cyclone on the 15th May 1863, the wind being at E. by S.; position of ship Lat 8° S. and Long. 83° E. She was kept running to the westward. The barometer went down on that day to 29·20 inches, the wind from N. E. to E., and the master considered his vessel on the S. W. side of the cyclone. At 2 P.M. on the 15th he hove-to on the starboard tack. At 4 the next morning, the wind having veered to N. E. and become more moderate, he bore up and ran to the westward. There was not a great deal of wind, but there was a heavy sea. She was afterwards abandoned. So far as exertions for the safety of the vessel and cargo were concerned, nothing seems to have been neglected by the master of the "Alice Maud." The weather she encountered, and which caused her loss, was excessively severe. Many vessels which were in the same gale have reached Port Louis in a shattered condition, and at least one vessel (the "Fairy") is known to have foundered in it.

The Marine Board remarked that the master of the "Alice Maud" made a fatal mistake; he appears to have known very little of the law of storms. Indeed, in his own evidence he gives the best proof of this, when he states that with the wind veering from N. E. to E., he considered that he was on the S. W. side of a revolving storm, and acted accordingly, and consequently acted wrong.

Storms of this nature in the Indian Ocean in the month of May are very rare, and many masters might have run before a northerly gale without thinking that they were on the eastern edge of a rotatory storm; this, however, was not the case with this vessel; the master considered, and truly, that there was danger, but, strangely enough, that the danger was to the N. E. and not to the N. W. of his vessel. He, therefore, with an E. N. E. wind, continued running to the westward, till the weather was so severe that he hove the vessel to in a perfect hurricane of wind at east, a fearful sea, and barometer at 29·20; he had, in fact, run faster than the storm, and into it, but no sooner (being hove-to) did the storm, by leaving him, cause the weather to clear and the sea to go down than he bore up and again ran to the westward with the wind at E. N. E., and was again on the point of overtaking the storm, when the leak increased to such an extent as to necessitate the throwing overboard of cargo, and a few hours afterwards the "Chanaral" coming to her assistance, the "Alice Maud" was abandoned with 11 feet of water in the hold.

"Mooresfort."

As the cause of disasters in the Indian Ocean is either through fire, current, or cyclone, only one more case—that of the "Mooresfort" (1051 tons)—will be dealt with. When I began my campaign against quarantine in the early part of 1897, I knew of such a wreck, but was not then in a position to trace her name. Those who followed my series of letters on quarantine, as it existed, from the French occupation to the present time, will no doubt remember what I said about the helplessness of vessels at the Bell Buoy in the cyclone season. In a letter I personally handed to H.E. the Governor, Sir Charles Bruce, I pointed out our wants in full; and I am glad to see that the new Quarantine Laws, 2nd February 1898, have provided for stress of weather, or *force majeure* at the Bell Buoy. The paragraph will be quoted in the Appendix.

To return to the "Mooresfort." Blame was attributed to her master for anchoring where he did. He expressed an opinion to his officers, during his last tea on earth, about quarantine. I am of opinion that he met his fate partly by quarantine laws as they then existed. The authorities could have had the vessel towed into harbour without anchoring.

The ship "Mooresfort" was commanded by Captain E. Caulthurst, and arrived from Calcutta off Port Louis, on the 1st February 1863, after a fine passage of thirty days. On that day the weather at Port Louis was threatening, the barometer falling, with a strong breeze blowing from E. N. E.; there was also a heavy N. W. swell rolling in, and a tremendous surf running on the reefs at the entrance of the port, and all along the western coast of the island.

It was reported by Pilot Edwards and others that the vessel anchored at 4-40 P.M., and from that moment it was evident to all who saw her that, unless she put to sea without loss of time, she ran the most serious risk of being driven from her anchor by the heavy swell (or, rather, rollers), and thrown upon the reef. The usual signal warning Bell Buoy ships to proceed to sea was therefore made from Fort George, accompanied by a gun; and as Captain Caulthurst had been twice at the port during the last eighteen months, and had each time been furnished with a copy of the signals in use at Port Louis, it was presumed that this signal would be understood. This was not the case. Consequently, no attempt was made to get to sea till past midnight, when the increasing severity of the weather and the driving of the vessel proved to the captain the danger his vessel was in.

This attempt, unfortunately, failed; and, about an hour later, the "Mooresfort" drove on the reef, and broke up so rapidly in the fearful surf that, by daylight, she was almost entirely destroyed. Out of a crew consisting of forty-two men and officers and four passengers, only fifteen persons were saved, Captain Caulthurst and the chief and second officers being among those that were lost. It appears from the evidence of the survivors that, in running down the trade, the weather had been remarkably fine and that even on the morning of the 1st, when the weather at Port Louis was very threatening to the north-eastward of the island, it was so fine that all studding sails had been carried till the vessel was well in with the land. The swell on the reef and, at the anchorage, the falling of the barometer were attributed by the captain to a cyclone that had passed to the westward, and the wind being then E. N. E. to N. E., it is presumed he considered himself safe from its effects; but at Port Louis, a shift to the N. W. is always dreaded at the close of these gales, and almost always occurs, of which the captain was probably not aware. Ships at the Bell Buoy are then on a dead lee shore, and the ground swell runs so short and so heavy that it is almost impossible to ride. Mr. Charles Porter, the third and only surviving officer, stated that the weather was fine to Flat Island, when sails were gradually reduced till near the port, when the fore and mizen-topsails were the only canvas set. The captain said that, but for the quarantine regulations, he would run into the port.

To my mind, and even that of most present-day masters, many lives and interests that have perished in the past could, in all probability, have been saved if it were not for quarantine laws.

The Ship "Shah Allum" left the Bell Buoy in a cyclone in January 1863 and never returned, so that whatever did happen is still untold.

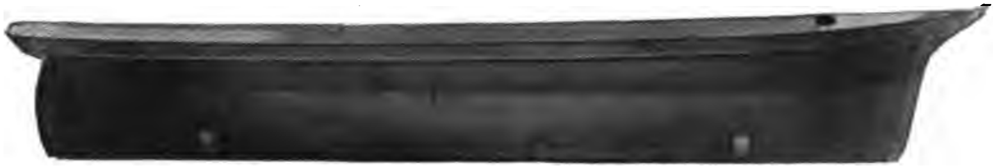
January, 1863.—B. S. "Provee," by cyclone.—Lost north of Cannonier Point.

February, 1863.—"Duke of Molakoff," by cyclone.—Lost west of Port Louis Harbour.

May, 1863.—"Fairy," by cyclone.—Abandoned at sea.

November, 1879.—"Genitiv," by current.—Farquhar Island.

December, 1880.—"Fairy Queen," by current.—West Coast of Madagascar.



BUILDER'S MODEL OF THE CHINA TEA CLIPPER "SIR LANCELOT."

February, 1892.—S.S. "Deccan," by cyclone.—Disappeared north of Mauritius. "Pacific," by cyclone.—Foundered at Cargados Group.

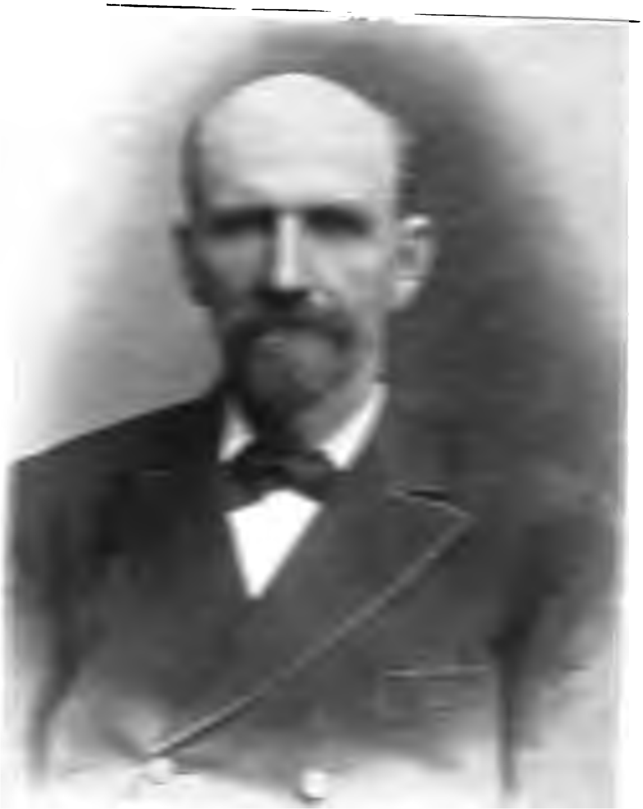
April, 1892.—"Marmion," by cyclone.—Disappeared from the Bell Buoy. "Trois Amis," by cyclone.—Disappeared from Réunion. "Darwin," by cyclone.—Wrecked at St. Denis, Réunion. "Lady Harewood," by cyclone.—Abandoned between Madagascar and Réunion. "Omar Pasha," by cyclone.—Supposed to have foundered east of Mauritius. "Star Queen," by cyclone.—Wrecked at Cargados Group.

December, 1894.—S. S. "Touareg," by gale.—Wrecked at Port Mathurin, Rodrigues.

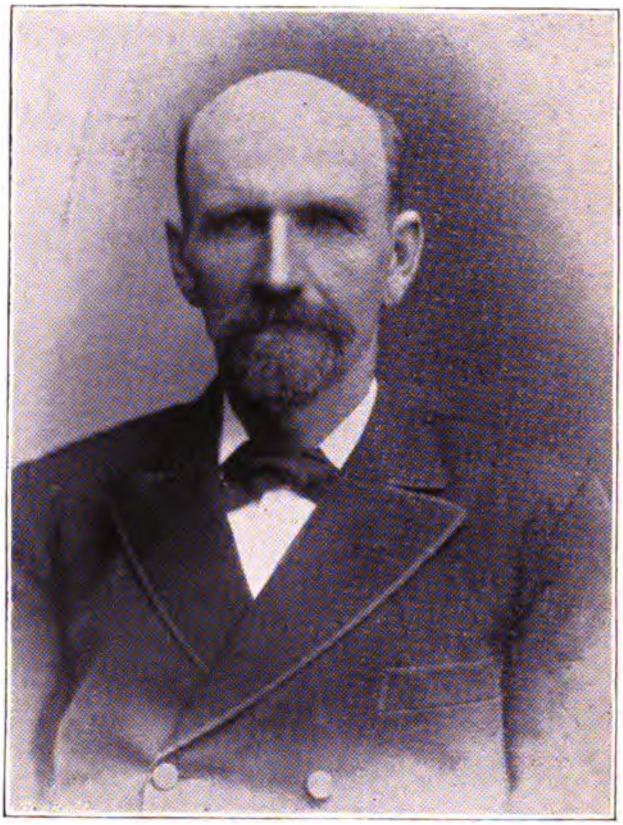
October, 1895.—"Sir Lancelot," by cyclone.—Bay of Bengal.

REMINISCENCES OF CHINA CLIPPER "SIR LANCELOT."

It is with pleasure that I am able to close this chapter of wrecks with a brief history of the China Tea Clipper "Sir Lancelot." She passed from my command in April 1895, having been sold to Persian owners. She sailed from Muscat in September of the same year for Calcutta, and never reached her destination. She must have foundered in a cyclone in the Bay of Bengal in October. Thus closed thirty years' career of a famous ship future generations are not likely to see. She was the yacht of the Indian Ocean. A late Admiral of the East Indian Squadron could never pass her, moored in Port Louis Harbour, without daily expressing his admiration of her gracefulness. Another writer and admirer is Lord Harris, late Governor of Bombay. The following appeared some years ago in various journals :—"One of the most readable and important articles in the current issue of the *English Illustrated Magazine* is that from the pen of Mr. Herbert Russel, whose subject is tersely summarised in the title of his paper, namely, 'Clipper Ships.' Mr. Russel deals with the size, characteristics, and sailing powers of several vessels, the names of which are familiar to all Clydeside. Among the vessels treated of by him, and illustrated by Mr. H. R. Miller, are the 'Sir Lancelot,' 886 tons register, fastest of the old tea clipper ; the 'Thermopylæ,' fastest sailing ship in the world, the 'Patriarch,' fastest between Sydney and London ; the 'Loch Garry,' 'the finest sailing ship afloat' was the verdict in 1875 ; the 'Loch Torridon,' built on the Clyde in 1889 ; the 'Liverpool,' largest English sailing ship afloat, built at Port Glasgow in 1889 ; and the 'France,' 'largest sailing vessel in the world,' built at Partik in 1890. In 1865, says Mr. Russel, there was launched from the yard of Messrs. Steele, of Greenock, a little vessel of 886 tons register, which proved to be the fastest ship that, down to this time, had ever sailed the seas. She was named the 'Sir Lancelot,' and so remarkable were her achievements that a description of some little fulness may prove interesting. Her length was a trifle above 197 feet 7 inches, and the depth of her hold 27 feet. She was what is called a composite-built ship ; that is to say, her frame-work was of iron and her sheathing of wood. The one idea in the construction of this vessel was speed ; everything likely to result in the attainment of this was aimed at. Before the copper was put to her bottom, her planks from the water line downwards were planned off, and the hard teak rendered as smooth as a ball-room floor. In order to give the vessel greater stability and enable her to carry her immensely long masts, nearly one hundred tons of iron pigs or 'kentledge' were fitted into the open spaces along the keelson between her frames. That she needed some such dead-weight as this to keep her steady may well be supposed when it is stated that in racing trim and under all sail, the 'Sir Lancelot' spread upwards of 46,000 square feet of canvas—perhaps the greatest area which was ever shown by any full-rigged ship. To her belongs the honour of having accomplished the swiftest passage on record of any sailing vessel between China and England. This was in 1869, during the fourth season of her running, and a year that seemed prolific in rapid ocean voyages. According to the entries made in her log-book, she left Foonchoofoo on the 17th of July; on the 7th of August made Anjer Light; on the 28th of the same month sighted the African coast somewhere to the eastwards of Buffalo River; on the 11th of September made her number off St. Helena; on the 10th of October passed the Lizard; on the 14th was berthed in the West India Docks, making a passage of about 14,000 miles in eighty-nine days against the prevailing monsoon. Her most remarkable run was made whilst crossing the Indian Ocean, when, on one occasion, she did by observation 354 statute miles in twenty-four hours; and this upon a westerly course in which she was meeting time, and must have gained, during that one day's work on the parallel she was then traversing, at least twenty minutes, which would represent the equivalent of another five miles to add to the apparent distance covered. For a consecutive week, with fresh beam winds, she kept up an average daily run of 300 miles. The most remarkable point about this vessel's extraordinary sailing qualities, according to Captain Richard Robinson, who commanded her, was the capacity of maintaining her high speed in the very lightest breeze and the power she had of fore-reaching against an almost dead-head wind."



CAPT. JOSHUA SLOCUM



Capt. JOSHUA SLOCUM.

CHAPTER XIII.

CAPTAIN SLOCUM AND HIS VOYAGE.

IN the preceding chapter I have been able to trace reminiscences of some important wrecks in the Indian Ocean, size, speed, and all the good qualities of modern ships. Chance has thrown a very interesting little vessel in my way which is worthy of being noticed. We have read of people with crafts of all descriptions seeking adventures, crossing the north Atlantic Ocean from west to east. The last were two Norwegians who crossed in a small row boat and landed on the coast of France in 1896. Another voyage is contemplated for 1900, after which, if successful, the adventurer will be one of the wonders of the coming Paris Exhibition. I have been successful in obtaining a photograph of the little "Spray" and her adventurous commander, Captain Joshua Slocum, who is now circumnavigating the globe alone, and without a chronometer. If ever the voyage is completed, the Captain's book, when it is published, will be worth reading, judging from his lectures. He claims to have had the good fortune of having picked up on the beach at Keeling Cocas Isle one of Pharoah's Chariot wheels. Mathematicians may be able to follow his unique calculations on the time and rate of progress of this mythical wheel from the bed of the Red Sea to where he found it.

Mauritius, 29th September 1897.—As Captain Slocum's name has been on everyone's lips here for the past week, I thought it would be well for me to call on the hardy skipper, and obtain some further details about him and his unparalleled voyage round the world. So yesterday afternoon I strolled down to the wharf and had the good luck to meet the skipper of the "Spray" on the landing stage. Captain Slocum kindly consented to have a chat with me on board his tiny craft. On nearing the miniature vessel, whose course Captain Slocum has directed round the world, I could not help shuddering at the idea of a man sailing round the world on board of her alone.

On stepping on board we at once proceeded to the cabin, which is a commodious one, considering the size of the "Spray." Here the Captain showed me many curiosities and objects of great interest to science which he has picked up during his long voyage, and I have no doubt that the latter will be highly appreciated by his countrymen.

Captain Slocum, as might be seen from his photograph, does not look like a strong man, although he is broad shouldered, but he makes up for this by the many qualities with which he is endowed, such as an indomitable courage, great energy, and tenacity of purpose. I may also add that the Captain is so very modest that he talks of his daring adventure as of something which is not very difficult to perform. It may interest readers to know that Captain Joshua Slocum comes from an Anglo-Saxon family, who, before they emigrated to the New World, belonged to the County of Somersetshire, where records concerning them can still be seen in some of the parishes of that county. About two centuries ago, some of the Slocums left the old country, set out for America, and settled in New England, where they have prospered so well, that the family is now a large one.

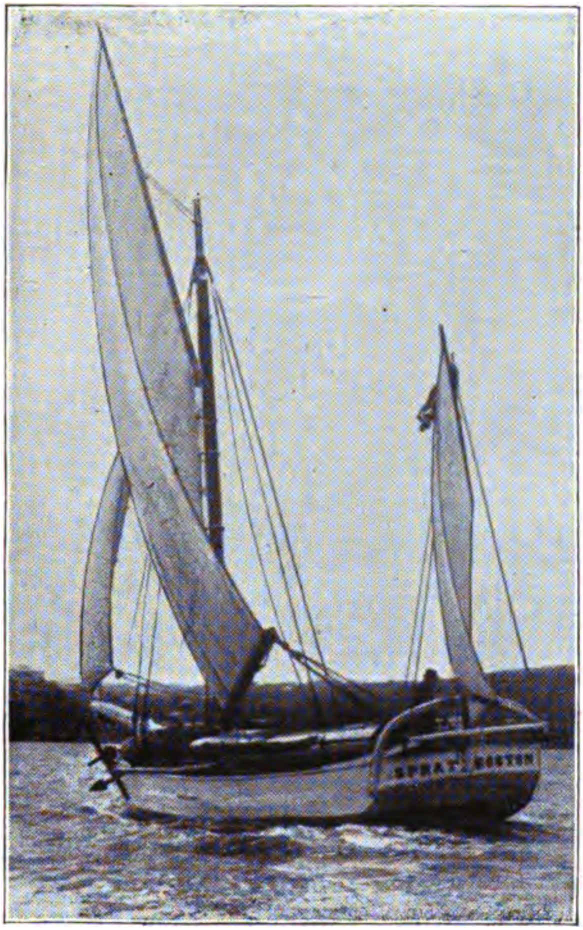
The intrepid Skipper is a Yankee, although he was born in Nova Scotia, but he never fails to tell his visitors that he is an Anglo-Saxon for all that, and he must have inherited his bull-dog courage from these hardy pioneers who colonized the New World two centuries ago—I must open a parenthesis here, and give the etymology of the name of Slocum or Slocombe as I believe it is spelt in England. "Slo" means a thorn and "combe" a valley. The Captain commenced his career at an early age before the mast, and worked his way up. He has commanded many vessels of all sizes and has often been round the world, but this is the first he or any one else has dared to face such a perilous adventure as the one he is now going through.

With regard to the present one many rumours are current here, as to the reasons which prompted Captain Slocum to undertake it. But all of them are far from being correct. The Captain says that he merely wishes to explore the world in his own way, and read the open book of Nature alone. Many would soon have given up such an arduous task, but the Captain is made of sterner stuff than most men, and he has now succeeded in accomplishing the greater part of his solitary journey across the barren ocean, and has sailed more than 30,000 nautical miles since he left Boston on the 24th April 1895. During that long voyage, the Captain has acquired a vast amount of knowledge, and we may be sure that on reaching Boston, which he expects to do in April or May 1898, he will give the world an account of his wonderful voyage. With his great modesty the intrepid Skipper touched very lightly on the perils he faced, in going through the Magellan Straits : nor did he say much of the boisterous seas he had to sail through. He had besides to defend himself against the Patagonian savages who have so often looted vessels and murdered every one they found on board. I will not attempt to give an account of the Captain's experiences during his voyage across the wide expanse of the sea. All those who have seen the tiny lugger of 9 tons, whose captain, crew, and cook are all combined in Captain Slocum, must have imagined how perilous such a voyage is, and will agree with me that none but a fearless child of the sea like Captain Slocum would have attempted to do such a thing. Wherever the "Spray" has called since she left Boston, the Captain has always been treated in a most hospitable manner, so much so that he told me jokingly that he could not have made a better world. He has also been delighted to see the interest children, all over the world, have taken in him and his voyage.

Captain Slocum is delighted with the reception he has met with in this Island. From the Governor and his worship the Mayor of Port Louis downwards, every one has been kind to him, especially our worthy Mayor, who placed the Theatre at his disposal. At the first conference which Captain Slocum held at the Theatre, the Mayor presented the Skipper in very appropriate terms and said that Captain Slocum had come to Mauritius to see Paul and Virginie's tomb and ascertain whether the island still maintained its reputation, not only as the star and key of the Indian Ocean, but also for its great hospitality. "Well now," said the Captain, "I have never met with greater hospitality and more kindness than in this island."

After spending a fortnight here, the Captain will sail for Réunion; from thence he will direct his course to the Cape of Good Hope, call at St. Helena, sail across to Trinidad, and after a short stay at Jamaica the "Spray" will return to Boston, where I have no doubt the Captain will meet with a hearty reception from his fellow countrymen.

This will not, however, be his last voyage, for in 1900 he will again sail across the Atlantic Ocean in the "Spray" and visit the Exhibition which is to be held in Paris at the beginning of the next century. Enquiring about his health, he said he is feeling much better than when he left Boston.



SLOOP "SPRAY."

9 TONS REG.

CHAPTER XIV.

LIGHTHOUSES.

Name and Character of Light.	Lat. S. Long. E. ° '	Description, &c. (Bearings by compass from the light).	Height above H.W.	Visible in Miles.
MAURITIUS				
GRAND PORT One fixed bright Light	20 23·3 57 47·1	Gray tower, 84 ft. high, on Ile aux Fouquets. Light not shown landward betw. S.W. by W. ¼ W. and N. by E. ¾ E..................................	108	16
Port Louis Lightvessel One rev. br. lt., 20 s.	20 8· 57 29·	In 15 fathoms, at the entrance, near bell buoy anchorage. Painted white	34	9
Canonnier Point One fixed br. or *red* lt.	19 59·7 57 32·5	On S.W. angle of tower, within battery. Light appears red inshore of S.W. ½ W.; obscured East of N.E. ¾ E. and S.W. ¾ S.	38	10
FLAT ISLAND One rev. br. lt., 1 m.	19 52·6 57 39·1	White tower, 53 ft. high, on S.W. angle of the island. Lt. visible 20 secs., obscured 40 secs. Obscured by Round Id. betw. E. and E. ½ N.	365	25
REUNION or BOURBON ISLAND				
St. Denis Two fixed lights	20 51·7 55 26·9	Vertically, 12ft. apart; on a flagstaff on the Barachois. Upper light red, lower bright......	85	7.
POINTE DES GALETS One quick-flashing br. light	20 54·6 55 17·6	Gray lt.-ho., 64 ft. high, 328 yds. within Pointe des Galets, on N.W coast. Light visible to North, between W. by S. and N.E. ¾ N. ...... When mail steamer is expected, a bright light is shown on mooring buoy, 1 mile S.W. by W. from point	90	15
St. Paul Bay One fixed bright light	20 59·8 55 19·3	Mast near landing place. Indistinct................	23	...
BEL-AIR One fixed bright light	20 53·2 55 39·4	White tower, 66ft. high, with two red bands near summit, on the point, N.W. side of Id...	148	18
St. Pierre One fixed *red* light	21 19·8 55 28·8	On mast at Harbour Office. Lights on jetties..	72	4
SEYCHELLES **Port Victoria** One fixed *red* light	4 36·7 55 31·	White coral lt.-ho., 42 ft. high, on N.W. point of Southern Reef, entr. to port. Lt. shown betw. N. & S.E. ½ S., except where obscured by Ids. Red lt. also shown over anchorage betw. W.S.W. & S.W. ½ S. Lights were shown on buoys when the mail steamer expected. Outer bell buoy light is red	37	9
Dennis Island One fixed bright light	3 48· 55 40·	White wooden lighthouse on a tripod, on N.W. side of island..	60	12
COMORO ISLANDS Fixed bright lights	12 46·7 45 15·	(Mayotta.) One fixed bright light on Zaudzi Jetty; one on jetty in Pamanzi Bay; and one on Mamoutzou Jetty	...	2
INDIA (West and Malabar Coasts).				
KURRACHEE 1. One fixed bright lt. 2. One fixed *red* light	24 47·6 66 58·6	Karachi, 1. White stone tower, 91ft. high, 607 yards N. 26¼° W. from S.W. bastion of Manora Fort. In S.W. monsoon, visibility much decreased .... 2. On extremity of Manora breakwater	148 ... 50	20 4 3
3. Three fixed lights	24 49·1 66 58·5	3. Two red lts. on inner bcn., and green lt. on outer bcn.; in line, N. 16° W. lead to entr. Only shown July 15 to Sept. 15, when sea may be too heavy for outer buoys to be lighted .... Harbour channel buoys bear lts., red on starboard side, green on port side, in entering.	30 22 20	3 3 3

Name and Character of Light.	Lat. S. Long. E. ° ′	Description &c. (Bearings by compass from the light).	Height above H.W.	Visible in Miles.
MANDAVEE 1. One 3-fl. br. lt., ½ m. 2. One fixed *red* light	22 49·7 69 20·4	Mandvi. Entrance to Gulf of Kutch. 1. White tower, 56ft. high, on S.W. bastion of fort. Light shows three quick flashes .... 2. On end of breakwater	115 24	18 4
GULF OF KUTCH				
Navinar Point One fixed bright light	22 44·5 69 42·	White stone tower, 60ft. N. shore of Gulf. Lt. shown to South, between E.N.E. & W.S.W. ...	50	13
Toona Creek One fixed bright light	22 55·5 70 7·2	Stone lighthouse, 34ft. high, on West side of entrance, North shore of gulf	32	6
Roji Island One fixed bright light	22 32·3 70 1·5	Nowa-Nugga Creek entrance, South shore of Gulf. White tower, 50 ft. high, on N. E. point of island. Light is visible between N.W. by W. ½ W. and N.E. by E. ½ E.	42	7
Beyt (Bate) Harbour One fix. br. or *red* lt.	22 29·3 69 4·7	Stone tower, 65 ft. high, on centre of Samiani Island. A red sector between N. 37½° E. and N. 67½° E., and another over Paga Bank, between N. 80° E. and S. 70° E.	71	13
Karumbhar Island One fixed bright light	22 26·3 69 34·7	White lighthouse, Patir Pir, 36ft. high, East side of Salaya Creek. Light visible between S. by E. ½ E. and N. E. by E. ½ E., through South & East.	30	10
Dwarka Point One fixed bright light	22 14· 68 57·	Kattywar Coast. Square stone tower, 25 ft. high, 117 yards within high water line	70	12
PUR BUNDER One fixed bright light	21 37·5 69 35·5	White tower, 88 ft. high, opposite entrance to inner anchorage. Light visible seaward between S. 49° W. and N. 49° W..................	90	16
Navibandar One fixed bright light	21 26·9 69 47·2	On wall of centre bastion. (Sept. 15 to June 15)	60	5
Mangarol One fixed bright light	21 6· 70 6·	Lantern on high house, 400 yds. from landing	75	6
Verawal One fixed bright light	20 53·5 70 22·	White stone tower, 40 ft. high, on pier, N.W. side of harbour. Lt. visible over arc of 180°	56	10
DIU HEAD One flash. br. lt., 10 secs.	20 41·3 70 50·7	White stone lighthouse, 32 ft. high, near the temple	106	14
Jafrabad Harbour 1. One rev. br. lt., 20 secs. 2. One fixed bright light	20 51·4 71 22·9	1. White stone lt.-ho., 50 ft. high, square below and circular above, on West side of entrance 2. Small light on quay, at N.E. extreme of town	85 20	15 2
CAMBAY GULF				
Kutpur One fixed bright light	21 2· 71 49·	On house on the bluff. Local light	90	13
Goapnath Point One fixed bright light	21 11·6 72 6·	Buff-coloured stone lighthouse, 32 ft. high, 240 yards within the point. Light visible from S.S.W., through East, to N.N.E.	68	6
Perim One fixed bright light	21 35·9 72 20·2	White stone tower, 73 ft. high, on the island, West side of the gulf	128	17
Gogha Bandar One fixed bright light	21 41·4 72 16·7	On iron structure; visible to North and East, between N.N.W. and S.E.	25	10
Bhaungar Channel 1. One fixed bright lt. 2. One fixed light	21 46·9 72 14·	1. Pile dwelling on West side of channel, West side of gulf .... 2. On the bandar. Bright, with red and blue sectors	48 ...	8 8

Name and Character of Light.	Lat. S. Long. E. ° ′	Description, &c. (Bearings by compass from the light).	Height, above H.W.	Visible in Miles.
Chilkari or Khunbander One fixed bright light	22 10·3 72 20·6	Black pile lt.-ho., 42 ft., 1 mile South of Creek. Lt. visible betw. N. by W. ¼ W. and W. ½ S., through N., E., and S. (Sept. 1 to June 15)	45	12
Whittlebander One fixed bright light	22 11·3 72 19·5	On a pole, West side of head of Cambay Gulf.	20	2
Cambay One fixed *red* light	......	Light vessel near the bar. (Oct. 1 to June 15) (Light reported to be bright)	...	8
Deojugan, or Tankaria One fixed bright light	21 55· 72 30·5	On a mast, on North bank of Dhardur River. (September 1 to June 15)	41	10
Lohara or Broach One fixed *red* light	21 39· 72 31·	Iron structure on North side of Narbada River entrance. Light visible to South, between E.S.E. and N.W. (September 1 to May 31)	30	6
Bhogwa, or Dandi One fixed bright light	21 19·7 72 35·	Mast on a low point, East side of gulf. (Sept. 1 to May 31)	107	8
TAPTI One fixed bright light	21 5· 72 37·5	White stone tower, 91 ft. high, on North shore of Surat River, near Vaux's tomb	130	15
Bulsar One fixed bright light	20 37· 72 58·	Mast at entrance to Bulsar or Oronga River (September 1 to May 31)	58	7
Damaon One fixed bright light	20 24·5 72 49·	Portuguese.] White stone lighthouse, 50 ft. high, on the bastion of the fort. Lt. visible seaward between North and South	67	12
Bassein One fixed bright light	19 20· 72 48·5	Lamp-post on rocks 400 yds. from pier.........	16	1
BOMBAY **Kolaba Lightvessel** One revolving *red* lt., 20 secs.	18 50· 72 46·8	In 6 fms., 4½ miles S.S.W. from Kolaba Point. Painted red, three masts, with red ball on main. From June 1 to Sept. 30, a blue light is burnt every half hour; and from Oct. 1 to May 31, a blue light every hour, and a torch every half hour. Red flag when a vessel is seen	36	9
Sunk Rock One occulting light, 5 secs.	18 53·6 72 49·8	Dark stone tower, 95 ft. high. Light eclipsed 1 to 2 secs. in every 5 secs.; bright between N. ¾ E. and N.E. by N. ½ N., red thence to S. by W. ½ W.; bright thence to S.W. by S. ¼ S.; and red thence to W. by S. ½ S.	94	14
S. W. PRONG One flash. br. lt., 10 s.	18 52·7 72 47·5	Tower, 146 ft. high, on S.W. Prong, 1¼ miles from Kolaba Point; is painted with white, red, white, and black bands	136	18
Dolphin Rock One fixed bright or *green* light.	18 55· 72 50·	Stone tower, 35 ft. high, on the rock. Light is green betw. South and East, bright betw. East and N E. by E. (over British mail S.S. anchorage), and green thence to N.W. by N..	20	3
North Channel Beacon Two small fixed lights	...	Vertical, 2 ft. apart upper red, lower green, while dock gates are open	...	...
Tourbah	...	A fixed bright light on Custom-house pier ...	12	5
KHUNDARI ISLAND One fixed bright or *red* light	18 42·3 72 48·8	Octagonal tower, 50 ft. high, on South end of Khundari or Kennery Island, South of Bombay Harbour. Sector of red light shown between S. and S.E. by S. ¾ S..................	158	20
Alibag One fixed *green* light	18 38· 72 51·	On fort Signal Station. Vis. to S., betw. S.S.E. and W.S.W. Must only be sighted by boats	32	3

Name and Character of Light.	Lat. S. Long E. ° ′	Description, &c. (Bearings by compass from the light).	Height above H.W.	Visible in Miles.
RAJPURI POINT One occ. br. lt., 15 secs.	18 16·8 72 56·2	Janjira Harbour. White lighthouse; 34 ft. high, on S. side of Rajpuri River entrance. Light is visible 10 secs., eclipsed 5 secs...	179	18
Dabhol or Anjanval One fixed bright light	17 33·8 73 7·8	White iron column, 28 ft. high, on Tolkeshwar Head, 100 yards W. by S. from the temple. Light shown from S. by E. ½ E., through S. and W. to N. by W. ½ W. (Sept. 16 to June 15) A green light at Anjanvel fort, and a red light at Bandar Dabhol	333	15
Jaigarh 1. One fixed bright light 2. One fixed *red* light	17 18· 73 11·	Jyghur. 1. Iron structure, about 40 ft. high on N.W. point of headland. Light visible seaward, between North and South............ 2. On N. bastion of fort, 1¾ mile eastward of No. 1	134 ...	13 ...
RATNAGHERRY One fixed bright light	16 59·5 73 15·8	White column, 35 ft. high, on an old fort on the bluff headland. Anchorage in 7 or 8 fathoms, at 1 mile to S.W	320	15
Rajapur River One fixed bright light	16 36·1 73 18·5	White lighthouse, 21 ft. high, on Keeva Hill, near south point of Rajapur River. Not exhibited between June 11 and September 9 ...	75	9
Malwan 1. One fixed *green* light 2. One fixed *red* light	16 3· 73 27·	1. Mast on the beach .... 2. Shown fron boat S.E. of rk., at entr. of port Both shown Oct. 1 to May 31. Entering, keep green light just open southward of red lt., and anchor with Vingorla Rock light bearing S. ½ W............	20 28	2 4
Vingorla Two fixed bright lights	15 51·3 73 36·2	Mast at 1 mile West of town, 21 ft. apart vertically. Not shown in S.W. monsoon, betw. June 15 and August 31	371 350	10 10
VINGORLA ROCKS One fixed bright light	15 53·3 73 27·3	White lt.-ho., 37 lt. high on outer Burnt Id., 9½ miles W. by N., from Vingorla Point. Lt. visible between S. 75° E. and N. 15° E., through South, West, and North	132	16
GOA One revolving bright light	15 29·4 73 45·7	Portuguese.] White tower, 53 ft. high, on Aguada Fort, on a hill above the landing-place, about a mile from the outer port. Light revolves in 1 min. 50 secs............	280	20
Marmagao	...	Red light on breakwater during N.E. monsoon	...	...
SEDASHIGUR BAY 1. One fixed bright light 2. One fixed *red* light.	14 49·2 74 2·7	1. White granite tower, 72 ft. high, on outer Oyster Rock .... 2. Red light on staff at the Port Office, near Koney Hill, at Port Karwar............	210 65	20 5
Tadri River One fixed bright light	14 31· 74 20·	Mast on North side of enterance. Visible betw. S. 17° E. and West (163°) Obscured over Snail Rock. (Oct. 1 to May 31)............	100	8
Kumta One fixed bright light	14 25· 74 22·5	Iron mast on North side of entrance to creek	116	12
Henavar River One fixed bright light	14 16· 74 25·	Mast on North side. Visible between S. 14° E. & N. 45° W. Obscured over Fortified Island. (Oct. 1 to May 31)	23	5
Butkul One fixed bright light	13 58· 74 31·	Mast on hill North of port. Visible between S. 11° W. & N. 56° W. Obscured over White Rock and Hog Island. (Oct. 1 to May 31) ...	100	8
Kundapur One fixed bright light	13 38·8 74 39·8	Mast on South side of harbour entrance. (Sept. 15 to May 31)	45	6

Name and Character of Light.	Lat. S. Long. E. ° ′	Description, &c. (Bearings by compass from the light).	Height above H.W.	Visible in Miles.
Hangarkotta One fixed *red* light	13 28·3 74 40·7	On North boundary pillar. Obscured by trees betw. N. 9° W. and North, and by St. Mary Islands. (September 15 to May 31)…………	12	6
Mulpy One fixed bright light	13 20·7 74 42·	Mast at river entrance. Visible seaward betw. N.N.W.&S.S E. except where obscured by St. Mary Isles. (Oct. 1 to May 31)…………	53	7
MANGALORE One fixed bright light	12 52·2 74 49·5	White tower, 65 ft. high, on a hill above the town, at 1½ miles E.N.E. from entr. to river	240	14
Kannanore One fixed *red* light	11 51·3 75 21·7	Small yellow tower on the ramparts, near the flagstaff. Visible between W. by N. ¾ N. and S.E. by E. ½ E………………………………	64	6
Tellicherry One fixed bright light	11 44·8 75 28·5	White tower near a flagstaff in the fort. Light shown from S.E. by S. ½ S.to N.W. by W. ¾ W.	88	8
Mahe River One fixed *red* light	11 42·2 75 31·2	French.] White beacon, 50ft. high, S. side of entrance. Only shown during N.E monsoon	68	6
Calicut One fixed bright light	11 15·2 75 45·6	White tower, 98 ft. high, on the beach. Light shown westward, from N. 14° W. to S.25° E. A small red light on pier-head occasionally	103	15
Narrakel One fixed bright light	10 2· 76 13·	From flagstaff. Light shown only during S.W. monsoon, from May 15 to September 30……	95	10
COCHIN One fixed bright light	9 57·8 76 14·7	White stone tower,91 ft. high, near the beach, South side of the entrance……………………	100	15
ALIPEY One rev. br. lt., 1 min.	9 30· 76 19·	White brick tower, 115 ft. high, on the sandy beach……………………………………	113	16
KADIAPATAM POINT One fixed bright light	8 7·5 77 18·2	(Mutum Point.) Granite tower, 72 feet high, black and white bands. Crocodile Rock lies 3 miles to S. W. ¾ S. ………………………	141	16
Cape Comorin	8 5·2	Lighthouse proposed…… …………………………	…	…
Manapaud Point One fixed *red* light	8 22·5 78 3·8	White lt.-ho., 27ft., 50 yds. N.E. of church. Lt. is visible to East, betw. N.N.E. & S.S.W.	104	12
MINIKOI ISLAND One rev. br lt., ½ m.	8 15·5 73 1·5	White brick tower, 122 ft. high, on S.W. part of island. To N.E. ½ N. light obscured by trees within about 8 miles; arc of obscuration extends to E.S.E. (74°), where the distance decreases to about 1½ mile ………………………	150	19

CEYLON.

Name and Character of Light.	Lat. S. Long. E. ° ′	Description, &c. (Bearings by compass from the light).	Height above H.W.	Visible in Miles.
COLOMBO 1. One 3-flashing bright light, ½ minute 2. One fixed *red* light 3. Two fixed lights, *red* and *green* 4. One fixed *green* light	6 55·9 79 50·9	1. In clock tower, 112 ft. high, in the centre of the fort. Shows 3 quick flashes of 2 secs. each in 12 secs., followed by 18 secs. eclipse 2. Lighthouse on extremity of breakwater… 3. Green lt. at W. end of coal depôt, and red light inshore of it. In line, bearing, S.½ W., lead between 2nd and 3rd lines of buoys. Three fixed green lights on extremity of landing pier … 4. Near extremity of N. E. breakwater works ………… One blue light burnt on Pilots' tower signifies pilot is coming off; two in succession, pilot is engaged; three in succession, cannot come off …………………………	135 56 50 …	17 10 3 …

Name and Character of Light.	Lat. S. Long. E. ° ′	Description, &c. (Bearings by compass from the light).	Height above H.W.	Visible in Miles.
BARBERYN ISLAND One rev. br. lt., 1 min.	6 27·8 79 57·8	White tower, 103 ft. high, on island, off S. W. Co. Ceylon................	150	18
POINT DE GALLE One 2-flash. br. lt., ½ m.	6 1·4 80 12·5	White tower, 80 feet high, on S. W. bastion. Light shows two bright flashes in 7 secs., followed by 23 secs. eclipse. Lifeboat......	100	15
DONDRA HEAD One rev. br. lt, 20 secs.	5 55·5 80 35·5	White tower, 156 ft. high, on South extremity of Ceylon	150	18
GREAT BASSAS ROCK One rev. *red* lt., ¼ min.	6 11·1 81 28·9	Granite tower, 127 ft. high, with conical roof, and one gallery at top of tower...........	110	16
LITTLE BASSAS ROCK One 2-flash. br. lt., 1 m.	6 24·6 81 44·	Granite tower, with dome roof, and two galleries at top of tower. Light shows two 7-sec. flashes in 22 secs., followed by 38 secs. eclipse	110	16
Battloaloa River One fixed bright light	7 45· 81 40·7	Flagstaff on the mainland at the watch-house near the river bar	47	8
TRINCOMALIE 1. One rev. br. lt. ½ m. 2. One fixed bright lt.	8 32·2 81 18·8 8 31·5	1. Gray tower, 120 ft. high, on Foul Point, S. side of bay. Eclipses not total within 8 miles 2. (81° 12¾′ E.) Gray tower, 69 ft. high, on Round Island, West side of the bay............	104 103	17 12
Muletivu Beacon	9 17·4	(80° 48½′). One fixed bright light......	79	12
Kankasentorai One fixed *green* light	9 49·5 80 1·	North Coast. Stone tower on West bastion...	75	6
Jaffnapatam	......	Green light proposed at boat channel entrance	..	...

COROMANDEL COAST and BAY of BENGAL

Name and Character of Light.	Lat. S. Long. E. ° ′	Description, &c. (Bearings by compass from the light).	Height above H.W.	Visible in Miles.
Tuticorin One fixed bright light	8 47·3 78 11·3	Brown tower, 91 ft. high, on North part of Hare Island, 2¼ miles eastward of Tuticorin	85	14
PALK BAY One fixed bright light	9 17·5 79 12·6	Round tower, 72 ft. high, 1 mile eastward of Paumben Pass	97	14
Tondi One fixed *red* light	9 44·8 79 0·5	Mast South of Custom-house, West shore of Palk Strait	63	10
Point Kalimere One fixed *red* light	10 18· 79 51·5	Steel mast, 45 ft. high, on North side of entrance to Palk Strait	55	6
Negapatam One fixed bright light	10 45·7 79 50·2	White tower, 83 ft. high, on bastion	80	14
Karikal One fixed bright light	10 55· 79 50·8	French.] On a flagstaff, North side of Arseiar River entrance	45	8
Cuddalore One fixed *red* light	11 42·8 79 46·3	On flagstaff. Visible to East between North and South................................	180	5
PONDICHERRY 1. One fixed bright light 2. Fixed *red* and *green* lights	11 55·7 79 49·9	French.] 1. Yellow tower 49 ft. high on the square near the beach.......................... 2. Red light on mast at end of landing stage. Green light is shown when surf is too heavy to approach it	89 31 26	14 4 3

Name and Character of Light.	Lat. S. Long. E. ° ′	Description, &c. (Bearings by compass from the light).	Height above H.W.	Visible in Miles.
Mahabalipur Pagoda One fixed *red* light	12 37· 80 11·	Gray turret 26ft. high on conspicuous rock about ½ mile inland 6 miles northward of Sadras	116	10
MADRAS 1. 2-flashing bright light, ½ minute 2. Two fixed lights 3. Two fixed *red* lights	13 5·3 80 17·	1. On tower of the Law Courts 93 yards to N. by W. ½ W. from site of former lt.-ho. on the Esplanade. Light shows flash 2 secs. eclipsed 3 secs., flash 2 secs., ecl. 23 secs. Visible to East, betw. N by E. and S. by W. 2. Outer light red, on end of iron pier; inner light green, on roof of Port Office. Visible seaward, betw. N. E. ½ E. and S. by E. ½ E. (112°); in line, lead into harbour. 3. One in tower on end of North mole, other in tower on end of South mole, of new harbour	166 30 60 87	20 5 5 6
Pulicat One fixed bright light	13 25·3 80 19·5	Column, 57 ft. high, painted in black and white bands, near the beach	68	14
ARMEGHON One rev. br. lt. 45 secs.	13 52·8 80 12·5	(Armogham.) White tower, 111 ft. high, at the village of Moona, or Moonapollium, 1 mile inshore, and 5 miles W. ¾ S. from the shoal	107	15
POINT DIVY One fixed bright light	15 59·5 81 8·	White column, 50 ft. high on N. Bank of river, 9½ miles 7° W. from Masulipatam light. Light shown eastward, from South to N.E.	48	12
Masulipatam One fixed bright light	16 9·2 81 9·	On the flagstaff, in the fort	69	6
Sacramento One fixed *red* light	16 35·3 82 17·	Wooden structure, 20 ft. high, near Kotapalem beacon, W. of Sacramento Shoal. Temporary.	25	8
HOPE ISLAND One fixed bright light	16 49· 82 19·5	Cocanada or Coringa Bay. Lt.-ho., 94 ft. high, black and white bands, on S. part of island. 2½ miles from sea. Light is visible seaward over arc of 180°, betw. N. ½ E. and S. ½ W.	83	14
Vakalapudi One rev. br. lt. 20 secs.	17 0·7 82 16·5	White column, 76 ft. high, abont 4½ milesN. by E. ½ E. from Cocanada disused lighthouse. Two small red lights at river entrance	80	14
SANTIPILLY One fixed bright light	18 4·9 83 37·6	White building, 32ft. high, on Santipilly Hill, ½ mile inland. Reef lies 6½ miles to S.E.½E.	163	14
Calingapatam Point One occulting bright lt., ½ min.	18 19· 84 7·5	Stone obelisk, 73 ft. high painted white with a blue band. Light shown seaward between N. E. ¾ N. & S. W. by W.; visible 27½ secs., eclipsed 2½ secs.	76	14
Gopaulpore 1. One fixed bright light 2. One fixed *red* light	19 13·5 84 53·5	1. On a flagstaff. Visible seaward between N. E. and S. W. (180°). 2. On extremity of pier	54 25	12 3
Pooree One fixed bright light	19 48· 85 49·2	Lantern on parapet wall of Circuit House, painted white	46	10
FALSE POINT One occulting bright light ½ minute.	20 20·3 86 47·5	Red granite lt.-ho., 132 ft. high, with a large white star on its E. face, 2 miles S. W. of pt. Lt. eclipsed for 4 secs., once in every ½ min. Sometimes obscured by fog in January, February, and March	127	19

Name and Character of Light.	Lat. S. Long. E. ° ′	Description, &c. (Bearings by compass from the light).	Height above H.W.	Visible in Miles.
DHAMRA RIVER One revolving bright light, 15 secs.	20 46·9 87 4·3	Red stone lighthouse, 70ft. high, near centre of Short Island. A lower fixed light on W. side of lt.-ho. shows narrow red and green sectors, with a bright ray betw. over fairway of entrance..	76 37	14 4
Balasore One fixed bright light	21 26· 87 2·5	On Chandipur flagstaff 1¼ mile S. W. of river entrance. Shown seaward betw. E. by N. and S. by W.	62	10
Pilot Ridge Light vessel One revolving bright lt., 1 minute	20 51·5 87 52·	Moored in 24 fathoms, March 15 to October 31. Painted red, with a ball below a half-ball base upwards at main. A flash of 10 secs. in every minute. A blue light every hour between 7 p.m. and 5 a.m.	44	12
HOOGLY RIVER **East Channel Lt.-Ves.** One revolving bright light, ½ minute	21 0· 88 12·7	Three masts, black ball at main. In 10 fms., at entr. to E. Channel. Lt. shows a flash of 5 secs. ev. ½ min. Blue lt. ev. ½ hour in S.W. monsoon from March 15 to Oct. 31, and ev. hour in N. E. monsoon, from 7 p.m. to 5 a.m.	44	12
Intermediate Lt.-Ves. One fixed bright light	21 15· 88 11·	Moored in 7 fms. betw. lower or E. Chan. lt. vessel and Gaspar lower lt.-vessel. Painted red, with a half-ball at main. In position from February 1 to November 30...............	48	12
Gaspar Lower Lt.-Ves. One fixed bright light	21 26· 88 7·	In Gaspar Channel, in 4½ fms., 13 miles N. N. W. from Intermediate light vessel. Blue light at ½ hour; and at every hour while Intermediate light vessel is not at her station. Black cone at mainmast head	48	12
Gaspar Upper Lt.-Ves. One fixed bright light	21 30· 88 8·	In 3½ fms. 8 miles S. by E. from Saugor lt.-ho. and 11 miles N. W. by N. from Lower Gaspar light vessel. Black drum at mainmast head.	24	9
Long Sand Light vessel One fixed bright light	21 33· 88 2·	In 22 feet, eastward of Long Sand, 4 miles S.W. by S. from Saugor lt.-ho. and 1 mile S. by E. from spit. buoy. Painted red; 2 black balls at mainmast head. (February 1 to November 30).	21	6
SAUGOR ISLAND One revolving bright lt., 20 secs.	21 38·5 88 3·	Iron tower, 76ft. high, painted red and white bands, on Middleton Point. ELECTRIC TELEGRAPH to Calcutta. Weather signals by day, and lights at night, are shown at Saugor Island, Mud Point, and Diamond Harbour..	74	15
COWCOLLY One fixed bright light	21 50·2 87 57·8	White tower, 88ft. high, 2 miles S. S. W. of Ketgeree Point. Lt. visible betw. S. by E. and E. S. E.; used as a guide for anchoring	62	12
Mutlah River Light vessel One 2-fl. br. lt., ½ min.	20 57· 88 33·3	In 18 fathoms. Painted red with a cone point down, over a half-ball at main. Lt. shows two quick flashes in every half minute	44	12

The Hoogly light vessels all show riding lights on fore-stay; and when out of position the usual lights are not shown, but only a red light at stem and stern. By day, when out of position, mast-head marks are struck. Rockets are fired when assistance is needed from shore. (In May, 1895, notice was given that at some future date the rig would be altered; each will then have a lantern mast and jigger mast only.)

APPENDIX.

A few years ago a letter appeared in the *Nautical Magazine* from the master of a steamer bound from England to Australia. His vessel was seriously injured by ice in the Southern Indian Ocean, and although Mauritius was nearer to him than any other port, he said that he preferred to risk his ship and the lives of all on board by going to Adelaide than bearing up for Mauritius to have his fine steamer and cargo pirated. In the January number of the *Magazine* for 1897 this appeared under the heading of "Underwriter's Gratitude":—"Captain———received a Cheque of £100 and a gold watch. The Underwriters spontaneously desired to mark their recognition of the splendid seamanship displayed by the master in navigating his steamer to Adelaide, and in the cost and delay he had saved by not merely proceeding to Mauritius the nearest port."

The assertion of piracy is extremely damaging to the shipping interests of Port Louis. It is a very handy port of refuge for all vessels bound to all parts of the East rounding the Cape. Take a glance at the Customs regulations, and it will at once be seen how hard it is to smuggle a box of cigars on shore; so I cannot see where piracy creeps in. I am willing to admit that up to 1890 there was a class of sharp adventurers from Europe and America, who came here as contractors, and they being wiser than the natives, had the lion's share of the lame ducks; as dismasted ships are known. They have all disappeared in ken, and the general contracting business is now in the hands of a respectable few. Distress vessels can now come and go without any inconvenience whatever, the owners being communicated with at any moment. Up to 1893 this could not have been done; now we have a cable. Quarantine that used to be such a bugbear to steamers calling for coal is reduced to a minimum. They can now be coaled and away in less than forty-eight hours, and even in a shorter time if permission is obtained from the Collector of Customs to coal at night.

The greatest activity is displayed by Government (who have the monopoly of towing), when a distressed ship is signalled, and a master can rest contented that if his signals are distinguished before dark, he will be boarded by the Government tugs with hawsers and other requirements during the night and towed into safety.

The "Pendeen," a totally dismasted ship, was signalled off Flacq in the afternoon, she was taken in tow during the night and brought to the Bell Buoy. Within ten days of her arrival a large portion of her outfit was ready to be shipped from Glasgow to Mauritius. Owners would do well to arrange their private code book to meet the requirements of any of their vessels putting into Mauritius in distress. The "Pendeen's" case is perhaps unprecedented in the annals of dismasted vessels that for a number of years used Mauritius as a port of refuge. The main-mast blew clean out of the ship from the kelson. Some journals seem to doubt this, but there is every probability of a like occurrence under similar circumstances with our present day ships. The "Pendeen" had three steel lower masts, and when she was dismasted the mizen-mast fell fore and aft the poop, bent and remained firm, the main-mast fell over the starboard side, and bent over the rail which acts as a lever. As the ship rolled to windward, the sea pulled the wreckage from her, and the mast kept bending with every roll, until it was pulled from below and into the sea. She arrived under an unusually small amount of jury canvas, even her boat sails being used.

Another great and serious objection the shipping community have of Mauritius is quarantine. Through my representations to Government, the new quarantine ordinance, which became law on 2nd February 1898, provides for the safety of vessels in the roadstead during the hurricane months :—

Pilot in certain cases may bring vessels to moorings in the Harbour, before Pratique.

"Chapter II, Article 17.—Whenever the Health Officer, either through stress of weather, or *force majeure* shall be prevented from going on board the vessel, and when the answers of the master as above provided shall satisfy the pilot that there is no contagious or infectious disease on board, and when anchoring at the roadstead would be attended with danger to the vessel's safety, the pilot may bring the vessel to moorings in the harbour at a place as distant as possible from the other vessels and from the shore, consistent with the safety of the vessel, but communication with such vessel other than such external contact as may be necessary to bring the vessel to her moorings shall not be allowed until she shall have been admitted to pratique by the Health Officer, as thereinafter provided. Such vessel shall, however, be bound to proceed to any quarantine anchorage, should the Health Officer, after investigation, deem such a course advisable."

Twenty-one days' quarantine is now a thing of the past; it is now fifteen days for plague and ten days for cholera and small-pox.

DRY DOCKS.

	Extreme length. Feet.	Extreme breadth. Feet.	Depth. Feet.
Albion	518	60	20
Hay	318¾	46½	15½
Stevenson	386	60	20

These docks, which are excavated in solid basalt, with sides nearly perpendicular, are situated in a large basin known as the Iron Fanfaron, the entrance to which is protected by a long breakwater. The passage leading to the Iron Fanfaron carries as much water as there is on the sill of the largest dock.

By reducing the height of the keel blocks to the level of the inverted arch or sill at the entrance, a vessel 52 feet broad, drawing 22 feet aft and 17 feet 4 inches forward, with a 260 feet keel, can be taken into Stevenson Dock. This dock could easily be lengthened to 510 feet. On the 30th March 1892 it was lengthened eight feet to enable the French S.S. "Pei-Ho," 3,325 tons, to enter for repairs.

There are also two patent slips in this basin : one is capable of hauling up a vessel of 450 tons, with 9 feet of water forward; the other can only haul up coasters or small vessels of from 100 to 120 tons. There are also moorings for seven vessels at the head of this basin. The average depth of water in the basin is from 19 to 24 feet, English measurement.

Messrs. Black & Smith, shipwrights, riggers and general contractors for all kinds of shipping work, possess a careening hulk, moored on the east side of the harbour, capable of heaving down a vessel of 500 tons. Assisted by a few lighters, she hove down the ship "I. Z. Skolfield," 1,400 register. This firm ensures vessels calling here for repairs the quickest despatch. The American ship "Solitar" from Java to America, put in for repairs in 1895. Only the foremast was standing, and with considerable damage about the deck. Messrs. Black and Smith repaired and had her ready for sea in four weeks, although a new suit of sails had to be supplied. They also supply ballast and can put on board and trim from 150 to 200 tons per day at Rs. 1-8 to Rs. 3 per ton, ship put down to her ballast-draft. On one occasion 500 tons were shipped on a steamer in thirty hours. Fresh water is supplied to ships in the harbour and Bell Buoy from Rs. 1-8 to Rs. 3 per ton of 250 gallons.

Carpenters and caulkers at Rs. 2-8 per day; blacksmiths at Rs. 3 per day.

Rice Vessels.

As an old hand in the trade, dating back from the time of the country ships, allow me to sound a few warning notes to vessels from the rice ports of Bengal and Orissa. These vessels get into difficulties more than others. It is not unusual to hear of a number of bags of rice being short, or a heavy claim for damaged cargo, or for a large amount of slack bags. This generally happens to the knowing ones, who, on arrival, will not be guided by local advice. They imagine that every person's hand is against them, when they themselves are paving the way for disputes. At the same time a master must not listen to any and every long shoreman that comes aboard his ship soliciting. Many arrive with a very bad impression of the port. No Mauritius Agents, European or native, will wilfully mislead a ship master; they are the proper persons to seek information from. On the other hand, a master who is courteous to the native merchants seldom has any difficulty in squaring up.

It is to the interest of the owners to allow the receiving and tally clerks a gratuity if they turn out the cargo correct. A good tally may be kept by the ship, but in discharging a large-four poster it is almost impossible not to make mistakes. Sometimes it is impossible to turn out correctly as the vessel may have left the loading port short. The boatmen at False Point and Balasore are not saints. After discharging each boat must be searched, as they usually make bags on their way to the ship. Any bags found should be taken away and sufficient rice allowed them for food to return. Always insist on the Customs Officer weighing the percentage required by Government for two reasons:—

1*st*.—Last season's rice (short weight) may be mixed with the new, thus throwing a quantity of slack bags on the ship to be claimed for at Mauritius. Loading at False Point I have had fully 15 per cent. short in weight in some consignments caused by evaporation. The barque "Japan," a few months previous, had to pay Rs. 1,000 for slack bags, which must have escaped the notice of the officer in loading. Sending slack bags back is not advisable; let the Customs Officer take note of them and sign mate's receipts and bills of lading to meet the case.

2*nd*.—Small merchants may ship in excess of the usual weight to save freight and defraud the ship if she is paid per bag.

In stowing, never use old sails in place of dunnage mats; canvas is sure to stick to the iron and eat through in a short time, especially with a rice cargo that sweats so much. The next result will be, that the cargo will be settled on to the bare iron if the dunnage is insufficient, whilst with mats it would be different. One arrival from Balasore had all the bags along both bilges damaged through the use of old sails and insufficient dunnage.

In taking in rattans at Calcutta with a miscellaneous cargo, never use it as dunnage; stow it with as much care as other cargo. In one case, where it was used as dunnage, they got damaged and caused much trouble to the master and a claim for three thousand rupees. A stranger attending to these few remarks is almost sure to keep out of trouble and perhaps heavy claims.

Ordinance No. 21 of 1897.

AN ORDINANCE

Enacted by the Governor of Mauritius and its Dependencies, with the advice and consent of the Council of Government thereof.

To amend Ordinance No. 3 of 1890 intituled "An Ordinance to amend the Harbour Dues and to consolidate the Laws relative thereto."

I assent.

CHARLES BRUCE,
Governor.

14*th October*, 1897.

WHEREAS it is expedient to reduce the fees levied on Vessels for Pilotage and to increase the Anchorage Dues;

BE IT ENACTED by the Governor, with the advice and consent of the Council of Government, as follows:

Pilotage and Anchorage Dues. 1.—The following Dues shall in future be levied on Vessels entering or leaving the Harbour of Port Louis:

I. PILOTAGE.

	Rs. c.
(*a*) For pilotage inwards and mooring; per ton of register ...	0·04
Provided that the minimum charge shall not be less than twenty Rupees (Rs. 20).	
(*b*) For unmooring and pilotage outwards; per ton of register ...	0·04
Provided that the minimum charge shall not be less than twenty Rupees (Rs. 20).	
(*c*) For the pilotage inwards and mooring of any steamer entering the Harbour merely for the purpose of taking coals, provisions, or water; per ton of register	0·04
Provided that the minimum charge shall not be less than twenty Rupees (Rs. 20).	
(*d*) For the unmooring and pilotage outwards of any such steamer; per ton of register	0·04
Provided that the minimum charge shall not be less than twenty Rupees (Rs. 20).	

II. ANCHORAGE.

	Rs. c.
(*a*) For every vessel breaking bulk or receiving cargo; per ton of register	0·38
(*b*) For moving any vessel from one berth to another in the Harbour:	
For vessels under 200 Tons register	20·00
For vessels over 200 Tons register for the first 200 Tons	20·00
For every ton of register over 200 Tons	0·02
(*c*) For every Colonial registered Vessel trading with Madagascar, Réunion Island or the Dependencies of Mauritius per ton of register	0·25
Provided that the last charge of 25 cents per ton on any such Vessel shall not be levied more than twice in one year.	
(*d*) For every Vessel not breaking bulk nor receiving cargo, per ton of register	0·23

Vessels exempted from Pilotage and Anchorage Dues.

2.—(1) No Pilotage or Anchorage Dues shall be charged on the following Vessels:

(a) British or Foreign Men-of-War and Transports or Vessels belonging to the Government of Mauritius.

(b) Vessels breaking bulk at the Bell Buoy and discharging cargo to the extent of not more than 25 tons or landing not more than 5 horses, mules, donkeys, or 20 sheep, pigs, and goats.

(c) Vessels touching at Port Louis without entering the Harbour.

Vessels exempted from Pilotage Dues only.

(2) No Pilotage Dues shall be charged on Vessels under One Hundred tons registered burthen on entering or leaving the Harbour.

Pilotage to be paid in certain cases.

Provided that Pilotage Dues shall be charged if the Commander or Master of any Vessel referred to in this Article has requested to be supplied with a Pilot.

Repeal.

3.—Sections *a*, *b*, *c*, and *d* under Article 1 heading (1) Pilotage, of Ordinance No. 3 cf 1890; and Sections *a*, *b*, *c* and *d* under the same article heading (3) Anchorage, and Article 3 of the same Ordinance are hereby repealed.

Short Title.

4.—This Ordinance may be cited as "The Pilotage and Anchorage Ordinance, 1897."

Commencement of Ordinance.

5.—This Ordinance shall come into force on the first day of January 1898.

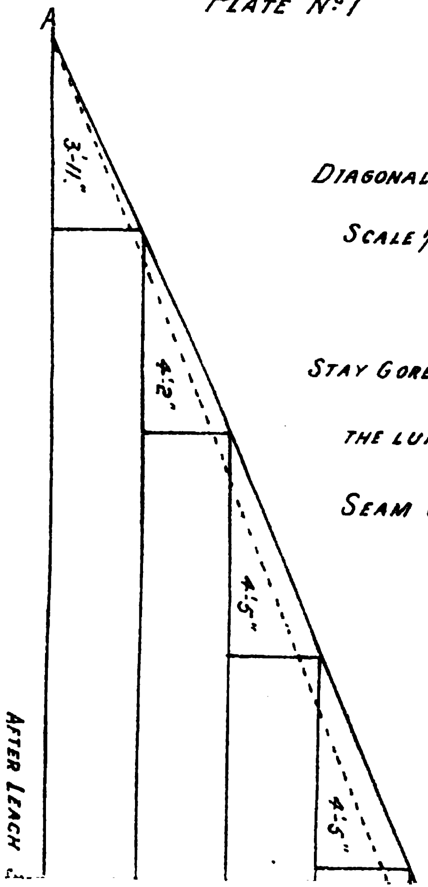
Passed in Council at Port Louis, Island of Mauritius, this twelfth day of October, One thousand eight hundred and ninety-seven.

Wm. C. RAE,
Clerk of the Council of Government.

Published by order of His Excellency the Governor this twenty-seventh day of October, One thousand eight hundred and ninety-seven.

DOUGLAS YOUNG,
Acting Colonial Secretary.

PLATE Nº 1



DIAGONAL GIB WITH ROUND IN LUFF

SCALE ¼ INCH TO THE FOOT.

NOTES.

STAY GORES ARE MARKED ALONG

THE LUFF ON PLAN.

SEAM GORES C.Dº 11½ INCHES.

PART II.

CHAPTER I.

EVERY OFFICER HIS OWN SAILMAKER.

INTRODUCTION.

A BOOK of sailing directions is hardly the place to study sailmaking; hence consider this attempt a deviation from the orthodox rule of nautical book-making. As a book of sailing directions it may only be used as occasion requires; but as a book embracing other subjects, it may serve masters and officers alike, and I have some anticipation of it aiding young officers in this particular branch.

Things are changing so rapidly that I see no reason why the art should not form part of this work. High class seamanship, of which sailmaking is a part, ought to be taken into consideration, as well as high class navigation. Steamers are all nowadays fitted with pole-masts; when the engines refuse to act they are powerless, and in many cases have to fall back on canvas. Take as an example the Messageries mail steamer "Pei-Ho," which broke down in July 1897 between Réunion and Tamatave. She returned to the latter port under sail. These steamers still carry a large amount of square sails. A steamer breaking down north or south of Mauritius in the S. E. trade, where she is not in the track of other steamers, an officer with a knowledge of the art could in a very short time convert awnings lying idle below into sails to allow his steamer to run before the wind for Madagascar, where she is sure to be picked up by the many French boats that now ply along the coast. It is said that sailmaking cannot be learnt from books; it is a trade to which an apprenticeship must be served, still it is not so formidable as some would have us, who are not of the craft, believe. Nothing perplexes the young energetic officer of the present as regards the planning and cutting of sails. I do not mean that an officer is to sit down with the palm and meddle himself planning and cutting; directing the joining is all that can be reasonably required of him. I have never yet entered a sail loft, still I plan and cut all my sails. I am an "Amateur Photographer," and nothing pleases me more than when I make a nice picture and a well-set sail. Sailmakers reading my explanations may smile, but they are only intended for younger members of the service when well away from a sail loft.

Genuine members of the craft are no doubt plentiful in Europe; out East they are conspicuous by their absence. Officers (especially chiefs) are usually called upon to exercise their judgment in this direction; if they cannot do it, they must depend on gunners and seacunnies. It is doubtful wisdom to expect these men to have a better knowledge of sails than the certificated officer. The few plans I have been able to produce here, at much expense, may assist those who have never given the subject their consideration. The student can work the plans out himself; he may find a difference of two inches the most in gores and other lengths, but this will make no material difference when we take into consideration that (so-called) rough sailmakers cut and make their sails fit from very inferior plans of their own production. All the plans set forth are actually in use on my vessel, a barque of 530 tons gross. The first plate is a diagonal jib. A person who can measure, plan, and cut this sail need not be afraid of any other carried on board a ship or steamer. I must also impress on the student's mind that, although his plan may be correct and the sail well cut, if it is not properly joined together it will not set to his satisfaction.

A beginner should always have his best man with him when cutting, who will afterwards do the joining and roping under his supervision.

A practice of mine on joining a vessel is to measure all well-set sails and awnings, make deductions for stretching, and plan them ready for use.

Measurements for a jib.

These explanations are for beginners.

The measurements required for this sail are five in number, but two, *viz.*, the angles of the stay and stave of jibboom, can easily be dispensed with, as I shall try to explain, by careful measurements. With jibboom rigged out, I have found the three sides sufficient for some vessels.

Measurement.

Staysails are measured in the same manner.

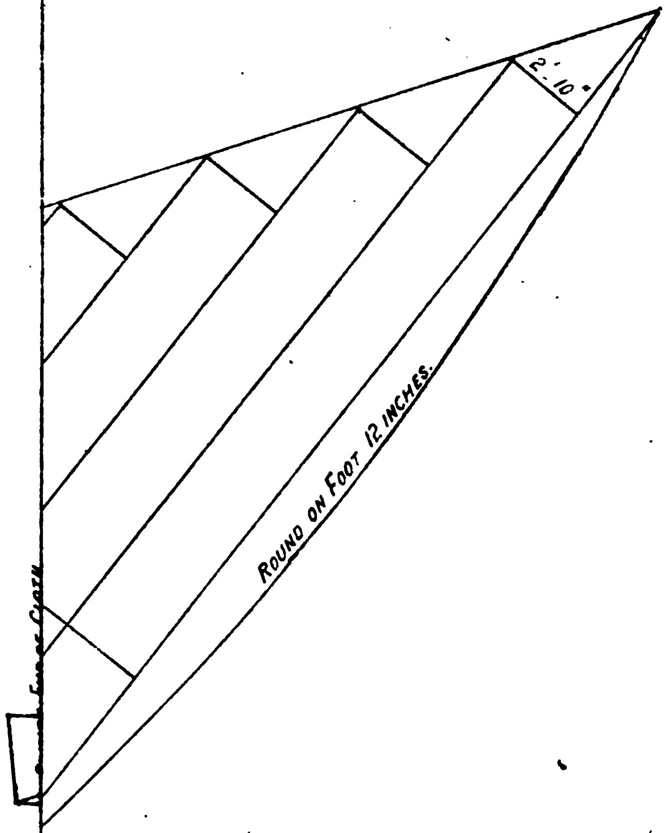
For the luff or stay, foot, and after-leach, hook the halyard on a hank, bend a piece of spunyarn of sufficient length to extend from where the head of the sail is required to be to the position of the tack, and reeve another piece of sufficient length to work both ends from the forecastle deck. When the halyard is hoisted up, this is for the after-leach; with one part put a common overhand knot slackly around the other; for the foot, bend the end of another piece of yarn on the double part of the overhand knot and lead it out to the jibboom. The measurer on the forecastle deck controls the double ends of the yarn to form the after-leach with the foot attached. A man on the boom controls the lower end of the luff and inner part of the foot, which is the tack, hoist up on the halyard to the required height of the head and let the man on the boom put a knot in the position of the tack; work the double part for the leach up and down also by hauling in or out on the foot until you are satisfied with the position of the clew; haul taut the knotted end which will jam the running part. Let your assistant on the boom put a knot on his end of the foot or tack, and the sail is measured. Haul down and measure off the three sides. The position of the clew should not be more than two feet abaft the foretop-mast stay for various reasons. Jibs with long foot are troublesome to get over the stay when tacking. Another objection is, it is blanketed by the foretop-mast staysail. Long luffs and short clews are preferable; these kinds of jibs are also suited for vessels with high stave.

Plan and method of construction.

Construct a triangle with the three sides obtained. A simple way to do this, so as to dispense with the other two measurements already mentioned, is to throw off a line across your drawing paper on any hand from top to bottom, measure off the length of luff from tack to head, and dot it. To find the position of the clew, take the extent of the after-leach in a pair of compasses, the extent of the foot in another, and set one leg of the compass with the after-leach in the dot in the head. A leg of the other with the extent of the foot of the sail in the tack where the other legs of the compasses join is the position of the clew; dot it, and draw lines representing the after-leach and foot, and the triangle is formed. This is a very simple method for the beginner.

Diagonal jib. (Plates 1 and 2.)

Having constructed the triangle A B C with the length of the three sides, find C D. To do this, take C as a centre, describe an arc F, H, and from the centres F and H describe arcs intersecting in G, and draw C G D. Opinions differ considerably as to round on the luff of jibs. I have continually used jibs with


2'-10"
ROUND ON FOOT 12 INCHES.
CLOTH

and without round and fire with tight wire stay. A round is hardly perceptible; but before proceeding further with the plan if a round is required, it must now be put. I shall give this plan a 5-inch round on the luff. The dotted line or jib stay is the first line drawn in pencil and afterwards dotted to prevent confusion of lines. Extend C D 5 inches off this line and sweep a curve line from A, the head passing through this extension to B, the tack. The dotted line is now discarded, as it is of no more use and only kept on plan for the student's information. Another way of putting a round on the luff will be explained in the old method of constructing jibs. Having given the round on the luff from the point D, let fall the perpendiculars D C and B C. C E equals the amount of seam gores. Canvas for ships' sails are 24 inches in breadth and seams are from 1 to 2 inches broad. In all my plans I have allowed 1½ inches. Now, take the extent of the remaining 22½ inches in a pair of dividers from the scale of ½ inch to the foot, divide D E into as many equal parts as there are cloths required to fill the width, and at each point of division draw parallel lines to A C and B C, joining exactly in the line C D. If they do not join in the latter line as in plan, the student will know that he is not proceeding right. The length of every gore will be found correctly off the perpendiculars D E; that is, lay the parallel rulers straight on D E and work them to where each line or cloth joins the luff. Draw a thin line across connecting any two lines; this will be the length of gore measuring from the point of connection to the extreme end of the line on the luff. The same is done for the seam gore, which must all be equal. It must be understood that a gored cloth is wedge-shaped, the sharpest end of the wedge here pointing towards the head and tack. For the seam gore the sharpest is towards the clew from the point D. Let us leave Plate 1 and cast a glance at Plate 2, which is complete and ready for cutting. The first plate seems complicated with too many lines, but this is to show the inventor's principle. Plate 2 can just be drawn in less than half the time required for Plate 1. This is the kind of jibs I prefer to cut, having no round on the luff on plan, but only on the foot, and even, sometimes, if I am short of canvas, I discard the foot round and have a straight foot.

Construction of Plate 2.

To construct this plan, draw the triangle as already directed, and find C D in like manner. To let fall the perpendiculars from the point D, simply take the carpenter's foot-rule or the parallel rulers, put the end straight on the line forming the after-leach and bring it across to the point D; draw a line to the luff cutting D, and you have the first perpendicular without any difficulty whatever. Turn the plan round and do the same with the lower half. To prove the accuracy of this simple method till the end of the ruler in the slightest manner, and it will diverge from the straight line, and consequently from point D.

Find the number of cloths and gores given below as in Plate 1.

Dimensions for cutting Plate 2:—Luff, 53 feet; leach, 35 feet 6 inches; foot, 24 feet; and from C to D 6¼ cloths, seam gore 12 inches.

Upper half of stay gores.			Lower half of stay gores.	
Head.	4 ft. 6 in.	Cloth 1	Tack	2 ft. 10 in.
„	4 „ 6 „	„ 2	„	2 „ 10 „
„	4 „ 6 „	„ 3	„	2 „ 10 „
„	4 „ 9 „	„ 4	„	2 „ 10 „
„	4 „ 9 „	„ 5	„	2 „ 10 „
„	4 „ 9 „	„ 6	„	2 „ 10 „
„	2 „ 4 „	„ ¼	„	1 „ 8 „

Canvas in the body of the sail, nearly 74 yards. The way to find this is Measure the length of each cloth of the scale on both sides of C D in feet and in inches, add their sums together, and divide by three to get the yards. This is not strictly correct, as all the cloths are deeply gored; but it is always best to indent for a little more canvas than less. Sailmakers' correct calculations would be useless here. It entails a large amount of figures, and simplicity is the aim for maritime purposes.

Cutting out.

It is advisable to stitch the cloth together as they are cut.

Each gore as it is cut must be marked.

Here the operator's attention must be on his work, for mistakes in gores are easily made which may prove troublesome with a waste of canvas. Commencing with the first cloth in the head, and which forms the after-leach, measure off 35 feet 6 inches, the canvas lying flat and straight on deck. On the head, measure the first gore 4 feet 6 inches down the canvas, strike a line across from edge to edge, and mark it, lay your straight edge diagonally from the left hand corner of the canvas to the opposite corner as in plan (the square at the head of plan is the square end of the canvas as it lay on deck), draw the gore line, and having satisfied yourself that you are proceeding right, cut the canvas. For the seam-gore, commence to cut from the clew. To do this, run a line to the opposite edge of the canvas, measure 12 inches upwards (the operator must always keep in mind that here he is working up towards the luff from C to D), draw a line from the extreme point or clew diagonally to the 12-inch point, and cut. You now have the first and second seam-gores on both pieces of canvas. Turn the bolt over and stretch it along the deck. With the first cut cloth overlap the canvas by 1½ inches for seams. It will at once be seen that the two seam-gores are straight, and that the same length of gores are required right up. Now for the next gore on the luff, both pieces being overlapped and tacked to the deck to keep them in position, from the inner or broadest part of the first gore cloth on the luff draw a line across the bolt. From this point measure the next gore (which is equal to the first). Downwards draw a line and cut the second gore for the luff; here you are going from A towards D, where all points meet. Continue in this manner until you come to a change of gore on plan 4 feet 9 inches. Here a word of warning is necessary. If in measuring for this, or any other increase or decrease of gore as may be obtained from your plan, and you find you are likely to go astray, simply carry the first gore down and no harm will be done; so that for this half you would cut for luff-gores 4 feet 6 inches and seam-gores 12 inches. The lower half is treated in like manner after cutting the first gore on the tack. The quarter cloth at D is cut large and can be trimmed after the sail is joined together. As the plan has been drawn without a round on the luff, a slight round can always be put by stretching the sail along the deck and lay a piece of rope along the luff and curve it to suit; pencil the curve and table down; if a round is not required, table down straight. To put a round on the foot, cut a piece of canvas 6 inches more than the half of the foot, split it in two, which is 12 inches each, put them together, sew it on the foot, and round it to suit your fancy. If a piece of canvas, the full length of the foot was ripped up for this round, the other piece would be wasted. By having it in halves 12 feet of canvas is saved; the extra 6 inches being left as a margin to work on.

Tabling.

For luff, leach, and foot, tabling about 3½ inches, some have different sizes. This is only a matter of choice; the sail will be narrower on the three sides by this amount of tabling.

Roping.

Manilla is greatly used in American vessels.

Here, again, opinions differ; the idea of splicing a stout piece of bolt rope in at the clew is out of date. For a sail of this size, I use one piece of 3-inch bolt rope right around, or a handy size piece of steel wire. The rope must, in all cases, be sewed on a jib slack; if taut, it will girt the sail, and make a well-cut jib set badly, and make the cutter think he has made a bad job of the cutting, especially if he be a beginner. The clew can be doubled with a small piece of canvas to strengthen it, extending a foot or two up the leech and the same on the foot.

This is the old method of constructing a jib. It is easy and does not require a long explanation. The triangle is constructed as in the others. To find the number of cloths draw a line at right angles with the after-leach, extending from the clew to the luff, to the extent of 22½ inches; the measure of the cloths along this line commencing from the clew. To counteract the girt strain from the clew to the stay, give a round to the luff, but, as I have already mentioned, for the other class of jibs I have never found any difference between a jib with a round on the luff and one without with tightwire jib stays. As this is only an individual opinion we will put a round on this plan. To do this, there are seven cloths above the right angle line extending from clew to stay, which is considered the maximum point of curvature in a jib. Set off on every cloth above this line upwards and off the dotted line 3 inches, and dot each; sweep a curved line through each dot, from head to tack, and the round is formed. In this plan, after drawing the round, I have effaced the dotted line, only leaving a small length at the head to show where the first line was drawn and also to prevent confusion; this is also one of the reasons it is called a dotted line.

Gores.

The gores on luff and on the foot are measured from the right angle line. In cutting out proceed as already explained for the upper half of Plate 2, the difference in this plan is that only two sides are gored, and the foot gores run from the clew towards the tack, where they meet those coming from the head at a point in the tack.

Sewing of seams.

Some sew a round and a flat seam, others two flat seams. I prfer the latter—in fact, round seams are out of date.

Round on the foot.

To give a round to the foot, the seams from below the clew are to be sewed broader than the above, increasing it towards the tack.

Staysails and Gaff Topsails.

Staysails and gaff topsails are planned on the same principle as the latter kind of jibs. The cloths can be measured on a line at any part at right angles with the after-leach crossing the stay or luff.

When the student has mastered the planning of jibs and wishes to put his knowledge into practice, he can commence in a more professional method as given here. Take a piece of drawing paper of sufficient size or the back of an old chart, and draw a rough sketch of the fore-end of your vessel. Throw up the foremast, foretop-mast, bowsprit and jibboom according to scale, say ¼ inch to the foot.

To get the stave for raising the bowsprit and boom, allow 3 inches to the foot from the heel of the bowsprit to the jibboom end; for instance, if the extreme length is 36 feet, the stave will be 12 feet; extend the deck line of the plan, and, on this line, with 36 feet in the compasses measuring from where the heel of the bowsprit is supposed to be, throw up stave 12 feet and draw the bowsprit and boom from the upper end, and you have your boom staved.

To reverse things, imagine a plum line let down from the boom end 12 feet to an imaginary position in line with the deck or heel of bowsprit; next draw the head stays down to their positions on the boom. By this method only two measurements are strictly required: length of mast, and length from mast-hole to jibboom end. All the head stays are bound to angle properly on the plan, and it can at once be seen where the clew of each sail is required to be. No other measurements need be taken. For flying-jib and foretopmast staysail, take half the length of stay for luff, for jib two-thirds the length of stay for luff. For the position of the clew for each headrail, look at the plan and judge where each sheet would come down on the forecastle head; this is the line of pull. Draw a line diagonally to the luff, fix a position on this line below the inner stay for the clew, and draw the after-leach and foot, and the sail is formed. Then proceed as already directed.

New-fashioned jibs are usually long luffs and high clews.

To give my last remark on cutting. Experts, I believe, would never trouble in drawing a round on the luff when planning, but would work in a round, when cutting, which is simple. Say the first gore at the head is 4 feet 6 inches. Shorten it by about ½ an inch, *i.e.*, make the first gore 4 feet 5½ inches, the next by an inch or so, until the diagonal cut is reached; commence cutting from the tack in like manner, and the sail will be nicely rounded. All other fore and aft sails are cut in this way with the exception that the round is carried from head direct to the tack.

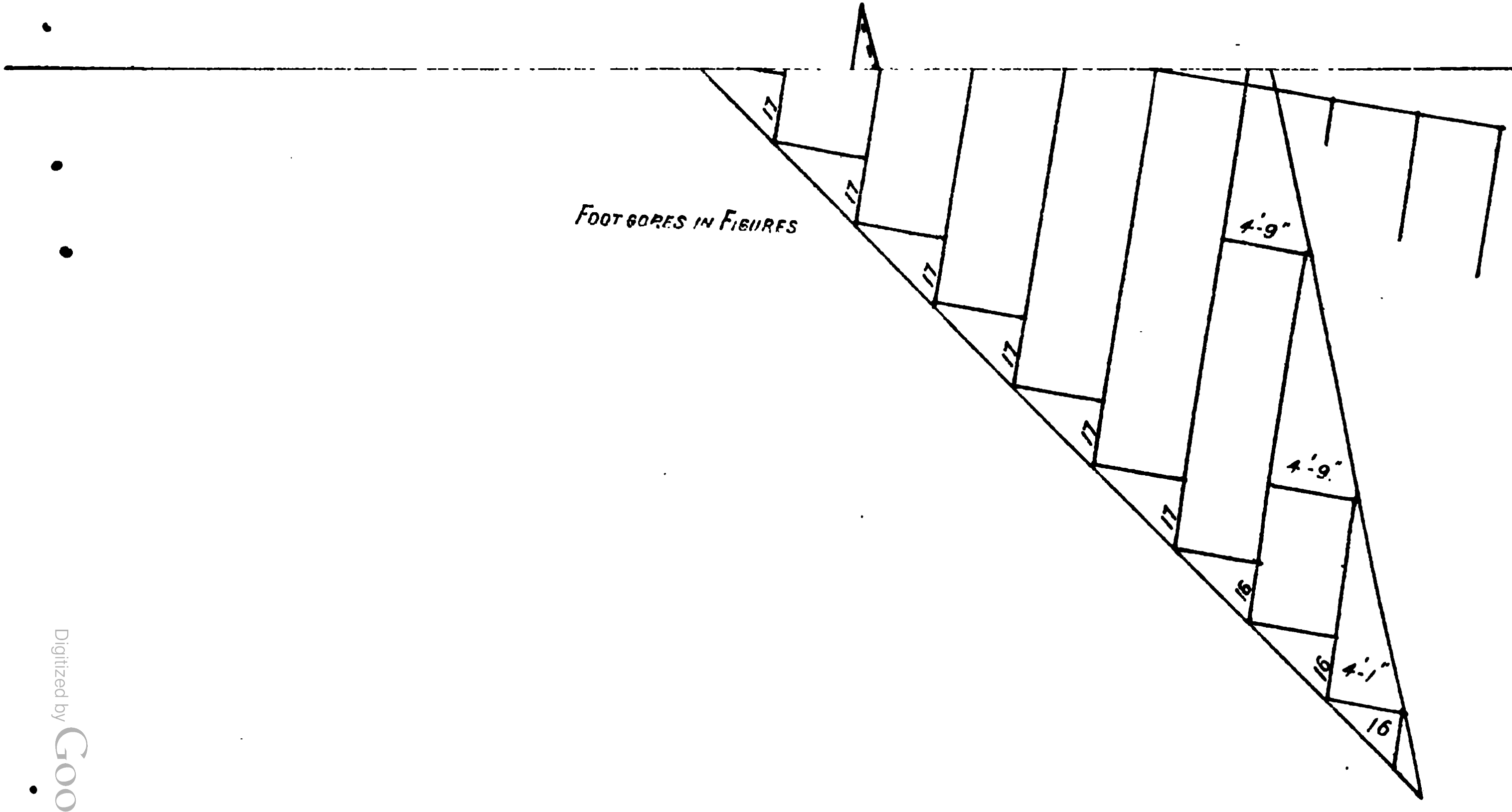
SPANKER.

Next to a diagonal jib this is the only sail that is a little complicated to plan and cut, as three sides are gored. The four corners of a spanker, or trysail, may be measured, lines drawn at random, sail planned and cut. This may set to the satisfaction of some, but not to others. Here I have erected mast, raised gaff and boom before dealing with the sail itself. As the lines are numerous, I have numbered those required first and must be followed in rotation:—

		Feet.	inches.
Measurements to erect mast, gaff and boom.	No. 1—Base line, any length	...	...
	No. 2—Mast, perpendicular deck to head ...	40	0
	No. 3—Mast raked	3	0
	No. 4—Mast-head to throat of gaff ...	11	7
	No. 5—Horizontal span	16	0
	No. 6—Full length of gaff raised in position	23	0
	No. 7—Full length of boom raised in position	37	0
	Height of boom from deck at mast ...	6	3
	Height of boom from deck at stern ...	7	1
	No. 8—Topping-lift...	38	0
Measurements for the sail.	*Head.*—Measure from 18 ins. inside the sheave hole to neck of gaff	21	2
	Luff.—Measure from neck of gaff to 14 ins. above the boom	20	6
	Foot.—Measure from position of tack to position of clew	33	10
	After leach, measure from clew to head ...	34	11

Span.

The horizontal span is not the full length of the span, but where it strikes the gaff in a straight line as near as can be measured from the mast-head.


FOOT GORES IN FIGURES
4'-9"
4'-9"
4'-1"

Rake.

To find the rake of the mast, take a piece of cord, let a man hold it over the lower mast-head abaft all and in the centre, the lower end weighted and hanging a few inches clear of the deck. Whatever distance it hangs clear of the mast abaft, is the rake of mast—that is, assuming the vessel is on even keel; for a steamer well by the stern this would give an erroneous rake. The best time to do this in steamers is when they are in dry dock. A weight bent on to the signal halyard would give the rake in a few minutes.

Commencement of plan.

Follow the numbers down by first drawing a base or deck line, throw up a perpendicular line at one corner full length of mast, throw off three feet to the left, and draw a line from the extreme point to the base, and the mast is raked; next measure off the length of mast-head, draw a horizontal line from mast-head towards the gaff, and dot the length; raise the gaff through this dot and that in the position of the throat on the mast, next raise the spanker boom according to the measurements, and draw the topping-lift, and mast, gaff, and boom are now in position for planning the sail. To do this, measure the length of the luff down the mast, and dot it; measure the length of the head along the gaff and dot it likewise. To find the position of the clew, do the same as for jibs: take the length of the foot in a pair of dividers, the length of the after-leach in another, set one foot of dividers with extent of after-leach in the head, one foot of dividers with extent of foot in the tack. Where the others join is the position of the clew; dot it and draw lines, representing the after-leach and foot, and the sail is formed. The next consideration is a round on the foot. If the sail is for a steamer's trysail, the dotted line from tack to clew would give all equal gores as on the head, and the sail would be easier to cut; but for a ship, a round is required to make it look ship-shape, if nothing more. To get this round we set off the centre of the foot towards the boom 12 inches, or as much as will clear the boom in a calm, and dot. Next sweep a curved line from tack to clew, passing through the dot, and the foot of your spanker is rounded as in plan. From the after-leach or any part of it throw off a line towards the mast, using simple method as explained for jib (Plate 2). The 22½ breadth of cloth and all gores is measured on this line. For a large sail two such lines are necessary: one near the clew, and the other near the head; for, shifting the parallel rulers over a large plan to measure the gores are apt to shift and cause mistakes.

Cutting.

Some prefer cutting from the mast. Cutting from the after-leach shows greater amount of confidence, as only the first cloth need be measured, the others are governed by the gores as each cloth diminishes in length towards the mast and the same down the mast until the last piece at the tack is reached. Every cloth must overlap the succeeding one by the breadth of seam, which is 1½ inches. When the next is cut, it is removed and marked in such a manner as to distinguish head from foot-gores when putting together.

Tabling.

Tabling on the head and foot should be about 3 inches; luff and after-leach an inch or so broader. A lining cloth of a foot broad should run up the length of the luff; reef band, if any, should not be less than 6 inches broad.

Roping.

For roping this size sail, I use 3-in. Europe all around or handy size steel wire. Like the jib, this sail should be roped slack to prevent it bagging.

LIFE-BOAT'S COVER.

While planning a boat's cover pay serious attention, as it is nearly all gored, running towards bow and stern from the centre.

The study of a forecastle head awning can also be made off this plan, as for a steamer with sharp bows, her forward awning will be deeply gored.

Measurements.

Measure extreme length of boat. For the extreme breadth, measure from the centre across from molding edge to molding edge with the fore and after shipped. For other breadths, divide the length of the boat from the centre into sections of three feet each, and measure across from each section.

For this plan the measurements are—

	Ft.	ins.		Ft.	ins.
Extreme length	19	0	Half	9	6
Extreme breadth	7	4	„	3	8
Bow—					
Breadth at (1st) forward section	7	1	„	3	6½
„ (2nd) „	5	6	„	2	9
„ (3rd) „	1	9	„	00	10½
Stern—					
Breadth at (1st) after section	7	0	„	3	6
„ (2nd) „	5	7	„	2	9½
„ (3rd) „	2	0	„	1	0

To plan.

Draw a centre line and dot off the extreme length; only one side or the half need be planned. From the centre of this line towards bow and stern divide into sections of three feet. For the first breadth take the half of the centre breadth in the dividers and dot it either to right or left of the centre of the fore and left line. Take the half of all the other breadths and apply them opposite their own sections on the same line. When this is done, draw a rounded line through each dot from bow to stern and the plan is shaped half size.

Cloths.

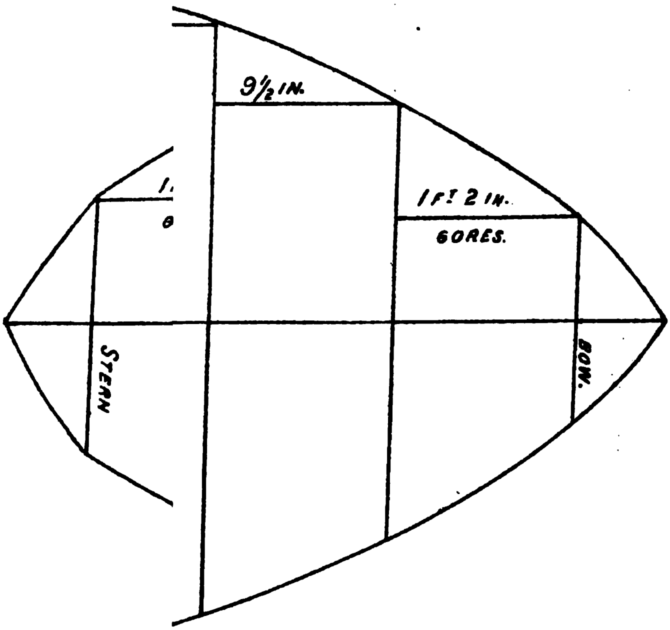
To find the number of cloths, measure one foot on each side of the centre breadth. This gives the first or centre cloth full two feet, and it is the only square cloth; all the others are gored. With the extent of 22½ inches in the dividers, dot off the other cloths towards the bow and stern on each side of the centre cloth until the ends are reached.

Gores.

To get the gores place the parallel rulers along the fore and aft line and move them up to the rounded line or the side where it joins the end of a cloth, draw short parallels and you have the length of gore to be measured from the scale.

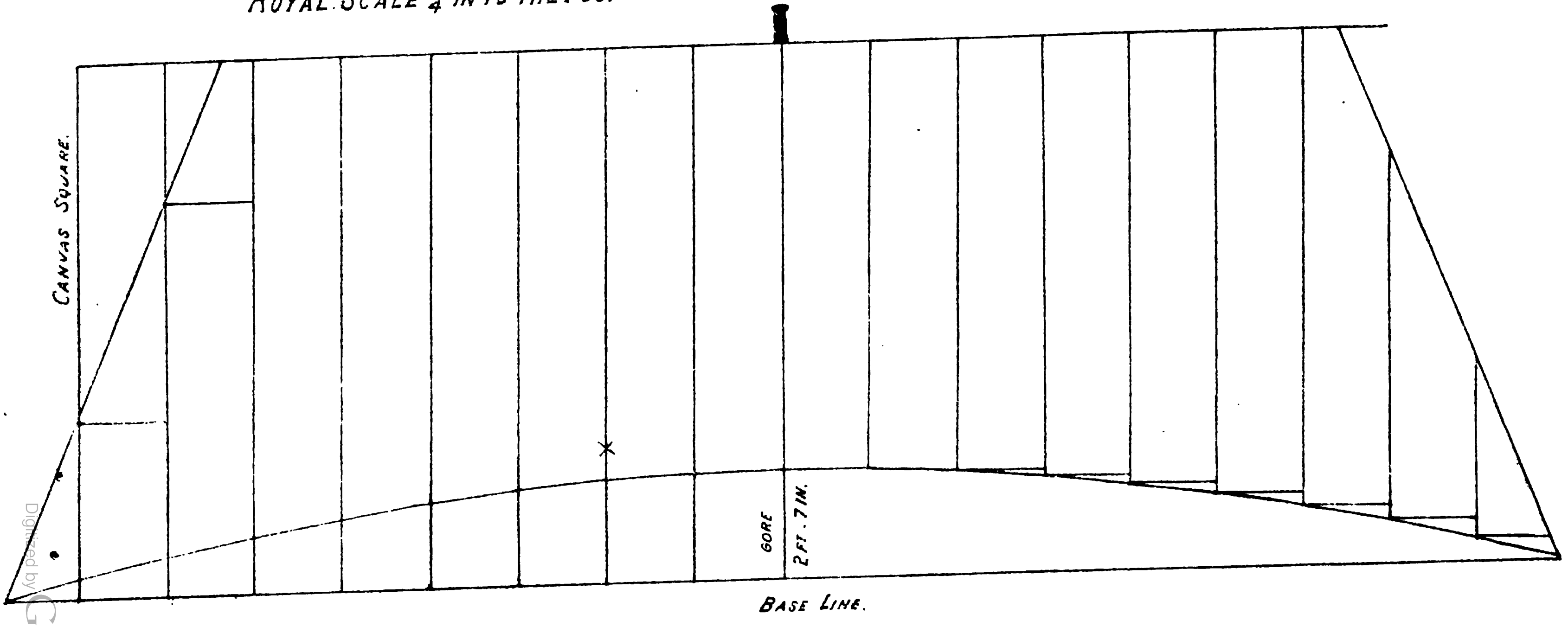
To cut.

The centre cloth is cut full length square. For the second cloth the cutter's attention must be directed towards the end of the boat he is going to cut first. Put a 1-inch gore on the canvas towards this end, take the half breadth of the cloth and double the canvas evenly, and the gore for one side will be the gore for the other; draw your line and cut. Follow the same procedure for all other cloths. It must be clearly understood that before the gores are measured, the canvas must overlap by the breadth of the seam or the gores will never meet. When all parts are joined together it can be placed over the boat and rounded to suit the officer's fancy.



LIFE BOAT'S COVER.

ROYAL. SCALE ¼ IN TO THE FOOT



SQUARE SAILS.

In drafting and cutting of square sails, the student hasn't much to study. If a person can cut a royal, he can master any other square sail, no matter how large. I have given the plan of a royal first as it is small and can be easily dealt with.

Dimensions for planning and cutting are—

Royal.

	Ft.	ins.		Ft.	ins.	Foot gores	Leach-gores. Ft.	ins.
Head	24	4	Half	12	2	1		
Foot	34	8	„	17	4	2	3	2
Hoist	12	00				3¼	4	10
Gore	2	7				4½	4	0
Middle	9	5 cut				5½		
						6¾	12	00
						7¾		
				Ft.	ins.			
				2	6¾	=30¾ inches.		

The usual allowance for stretching up is 2 inches to the yard in hoist, gore or foot deducted from hoist.

The five measurements are from where the sail is required to be when finished and set, allowing according to the quality of canvas for stretching up; some of the present day canvas stretches considerably more than others.

Drafting.

In drafting out a square sail only the half of it is necessary. Run a base line along the lower part of the drawing paper, throw up a perpendicular line upon the base on any part you choose, but sufficiently from the ends for the half extent of the foot; measure off the hoist from base, up the perpendicular; next draw a line parallel with the base, cutting the hoist on the top. This is for the head of the sail or royal yard. From the centre towards the yard arm, after making due allowance for the overlap of seams, take the remaining breadth of the canvas in the dividers and dot off the half length of the head; next the half length of the foot from centre towards the clew on the base line. The dots for the head must be carried beyond the length of head; this is to meet the leach. Draw lines through each from top to bottom for each cloth. For the leach, a line from extreme head to clew passing through two straight lines gives the length of leach. To get the foot gores as shewn above, take the extent of the given gore 2 ft. 7 ins. in the dividers and set it off from base to centre or first perpendicular; this gives the middle cloth above the gore 9 ft. 5 ins., and is called the middle cut. Draw a roach line from clew to clew passing through the gore measured. This roach line is no more to be taken into consideration; it is only drawn to give a shape to the sail; but if it was accurately drawn, it would give the length of gore for each cloth. People who are used to sails use it, but they know when to correct their cutting when thrown out by this way; so to get the foot-gores correctly, they must be calculated in the following manner. This being a small sail, only two cloths on each side are square. The gores commence from the third cloth or at the cross in the plan; or, in other words, it starts opposite the base line at the cross, and the 2 ft. 7 ins. or 31 ins. must be divided proportionately between seven cloths until it reaches the base again at the clew. A few inches more or less makes no difference. It is preferable to have the gores a little longer at the clews.

Seams, 1½ inches. Breadth, 22½ inches.

Leach-gores. For the leach-gores measure from head or base to where a straight line cuts the leach, draw a short parallel line at this point, the length of each leach-gore is measured from one parallel to the other on a straight line.

Base line and gore. The base line represents the top-gallant yard hoisted up in its position, and the gore or roach on the foot of the royal when set allow it to clear the top-gallant stay by a few inches. This is the reason why royals, top-gallant sails and lower topsails are so deeply gored. Upper topsails are gored just sufficiently to clear the crane of the lower topsail yard.

Cutting. To cut this sail, measure off the middle, cut 9 ft. 7 ins. on the deck and put a chalk mark at each end, cut the four square cloths and number them (o), and if you are cutting the right or starboard side first overlap the canvas by the breadth of seam on one square cloth, measure off on the bolt of canvas a gore of 1 inch towards the clew or from you, and cut and mark it (S 1). The bolt contains the same gore for the opposite side, turn it over, measure full length, cut and mark it (P1).

This explanation suffices for all square plans. It is said that one gore cuts the other. Continue increasing the gores as given in dimension until the clew is reached. By looking at the short parallel lines or starboard side of the plan the student will see how the gores increase towards the clew, and remember always that each preceding gored cloth must overlap the succeeding by breadth of whatever seam employed before the next gore is measured and cut.

Linings. This sail is made of present day No. 3 or 4 canvas; with first class quality No. 5 or 6. The foot is lined with one-third of a breadth of cloth from clew to clew and the leaches about the same. Tabling at the head 2 or 3 inches.

Rope hemp. Head 1¼ inches foot and leaches 2½ inches.

TOP-GALLANT SAIL.

Dimensions for drafting and cutting :—

	Ft.	ins.	Foot-gores.	Leach-gores.	
				Ft.	ins.
Head	... 33	6	1	2	3
			2		
Foot	... 42	0	3	7	10
			4		
Hoist	... 17	6	5	7	00
			6	—	—
Gore	... 3	8	7	17	1
			8		
			9		

Middle cut 2 square cloths on each side of 13 ft. 6 ins.

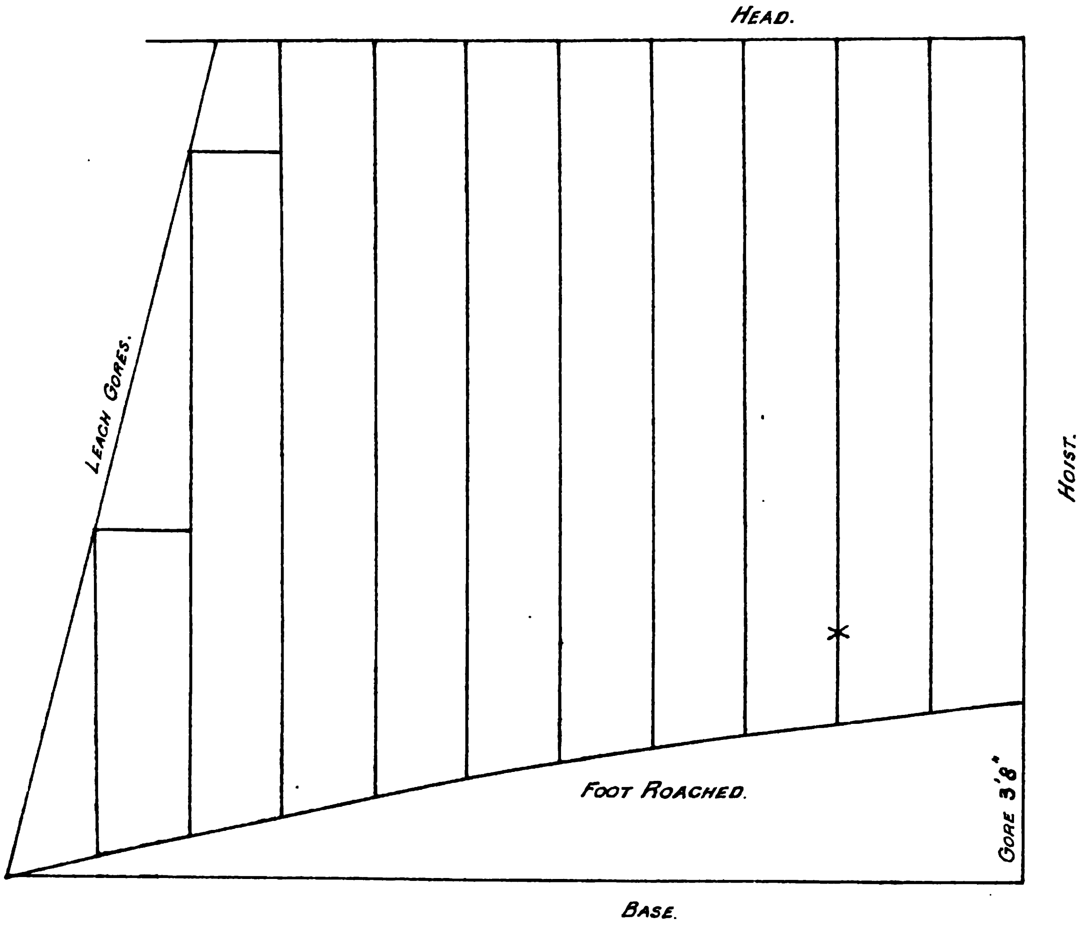
ft. in. —

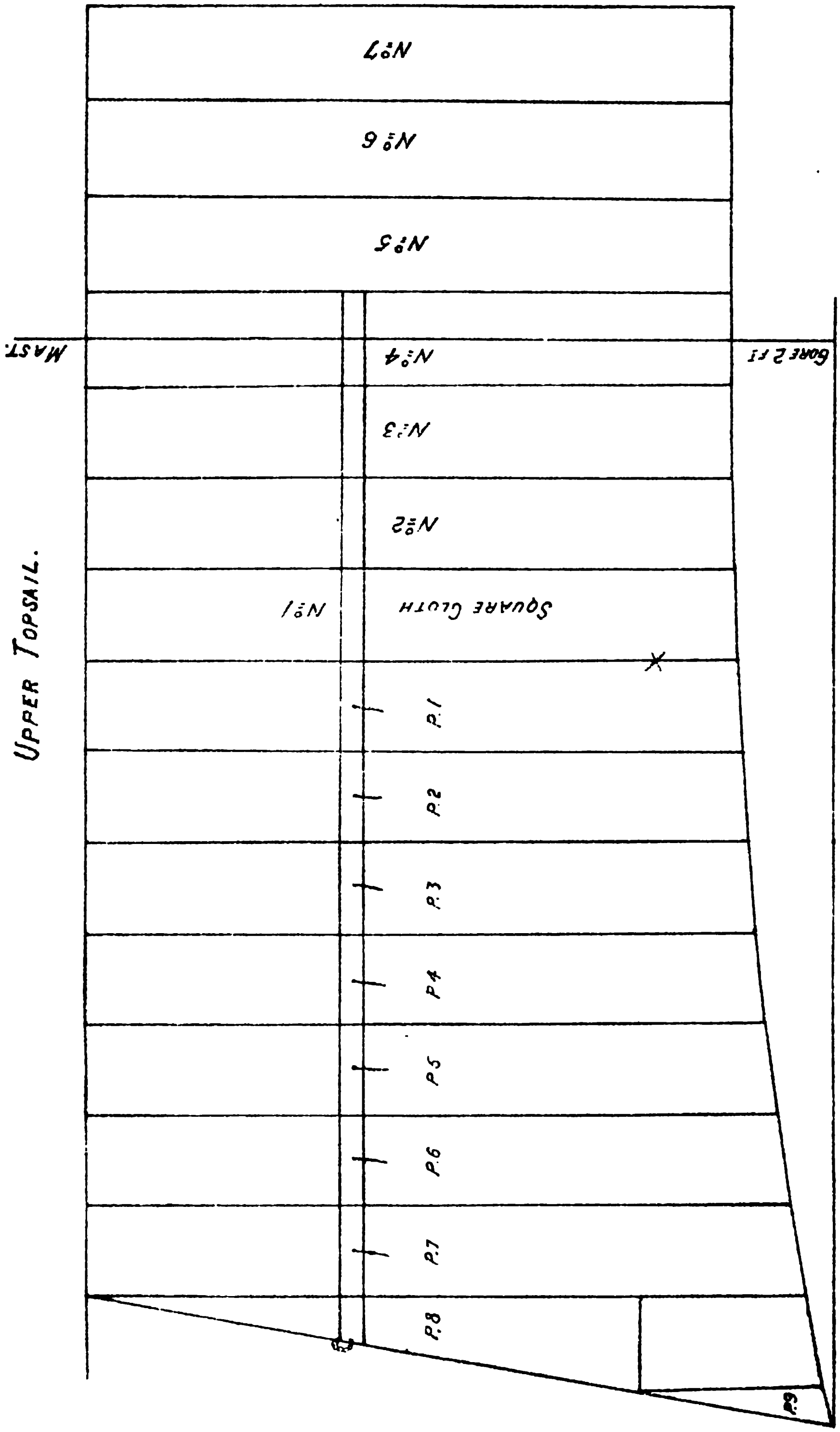
3 9=45 inches.

This sail is made of No. 3 or 4 canvas. Lining on the leaches and foot are of half a breadth of cloth extending from clew to clew and clew to earings, respectively. A top lining above the foot on the aft side of sufficient breadth to take the chafe on each side of the cross-trees is also required. A cloth runs up the mast to take the chafe and grease, but this is not always done in small vessels.

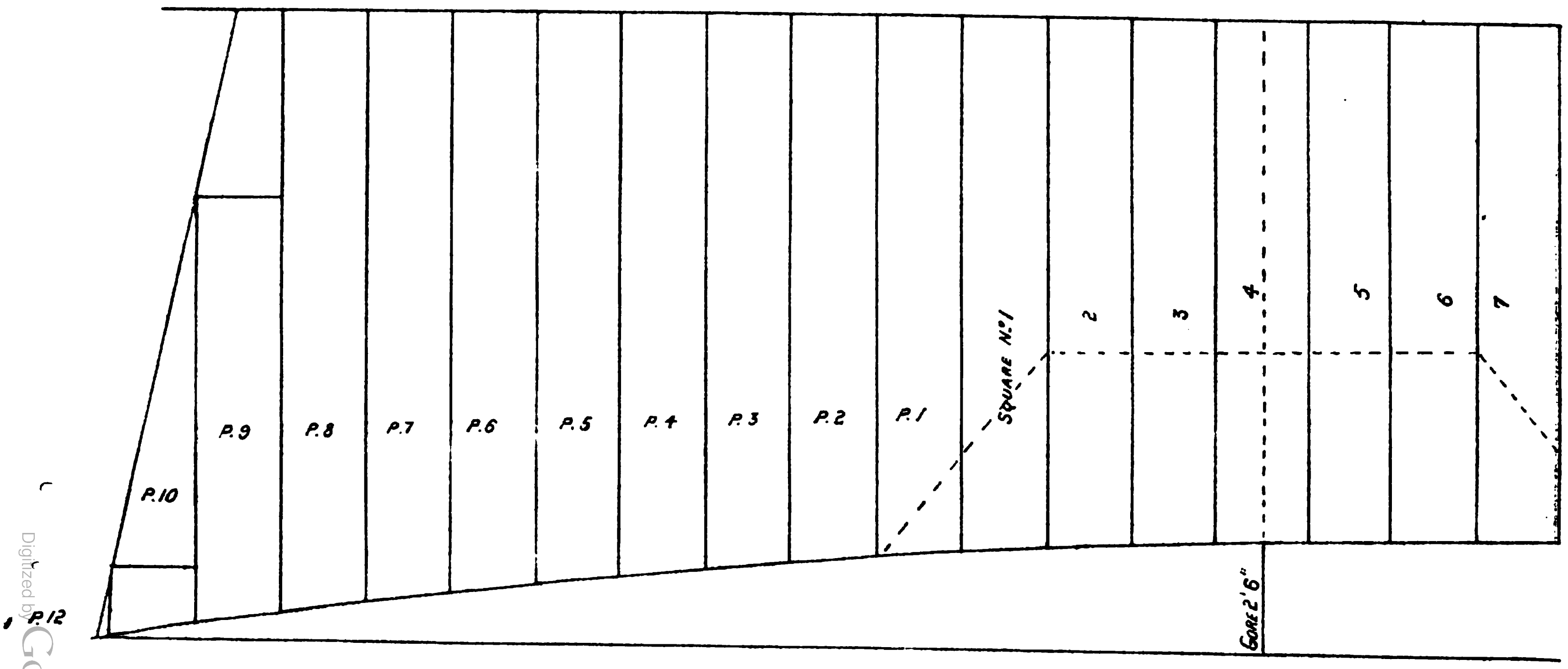
Rope. Head 1½ inches, foot and leaches, 3 inches. Bolt rope are at present discarded by many for steel wire. In my ship only the royals and the heads of other sails are roped. Leaches and foots are wired.

TOP GALLANT SAIL




UPPER TOPSAIL.
MAST.
GORE 2 FT
N° 7
N° 6
N° 5
N° 4
N° 3
N° 2
N° 1
SQUARE CLOTH
P.1
P.2
P.3
P.4
P.5
P.6
P.7
P.8
P.9

LOWER TOPSAIL



UPPER TOPSAIL.

The following are the dimensions for drafting and cutting :—

	Ft.	ins.		Ft.	ins.	Foot-gores in inches.	Leach-gores. Ft.	ins.
Head ...	41	6	Half	20	9	1		
Foot ...	47	0	„	23	6	1½	11	11
Hoist ...	16	0				1½	4	0
Gore ...	2	0				1½		
Middle ...	14	0 cut 7 squares.				2½	15	11
						2½		
						3½		
						4½		
						5½		
						2 ft.=24 ins.		

The gore in this sail being only 2 feet, commence with 1 inch and divide it between the nine cloths to be gored, increasing each gore towards the clew until the full 2 feet is obtained. (See gores above.) Leach-gores are measured as already directed.

Another method of finding the number of cloths in a square sail is shown in this plan and will be adapted for those following. Here the breadth of seam is deducted off every cloth except one, *viz.*, the centre cloth at the midship stop. To find the cloths by this manner proceed thus:—Measure off 1 foot from each side of the centre line and dot it ; this is considered as the centre cloth and is square. For all other cloths with seam deducted measure on either side until the width is filled ; then proceed with plan as usual.

In cutting out mark all square cloths with an (O), port-gores (P 1), increasing the numbers towards the clew, for starboard gores (S 1), increasing the same way. By paying attention to correct marking, confusion is not made in putting together. I have seen gored cloths turned upside down by good men and joined, and the error was only found out when I was called to see what was wrong.

This sail is made of No. 2 canvas and lined with a lighter number. The reef band is 5 ft. 6 ins. from the head when tabled, and 12 inches broad. Three inches are turned in at the head for tabling.

Roping.

If bolt rope is used, head 2 inches, foot and leaches 4½ inches, same breadth of lining as for top-gallant sail, or it may be a little broader; a whole cloth is carried up the centre to take the chafe and grease from the mast, but this is not usually done by every person handling sails.

LOWER TOPSAIL.

This sail is usually made of No. 1 canvas. The following are the dimensions for drafting and cutting :—

	Ft.	ins.	Foot-gores in inches.	Leach-gores. Ft.	ins.
Head	45	0	1	4	1
Foot	51	0	1¼	8	0
Full depth yard to yard ...	13	10	1½	1	7
Gore	2	6	1¾		
Middle	11	4	2		
			2¼		
			2½		
			2¾		
			3		
			3¼		
			4		
			5		

ft. ins.
2 6¼=30¼ inches.

For lining cloth, see dotted square on plan.

Mainsail made of No. 1 canvas. The following are the dimensions for drafting and cutting :—

	Ft.	ins.	Foot gores in inches.	Leach-gores. Ft.	Leach-gores. ins.
Head	49	4	1	4	7
Foot	55	0	2	19	6
Leach	30	7	3	6	1
Drop at Middle	26	6	4		
Gore	4	0	5		
			6		
			7		
			9		
			11		
			4 ft.=48 ins.		

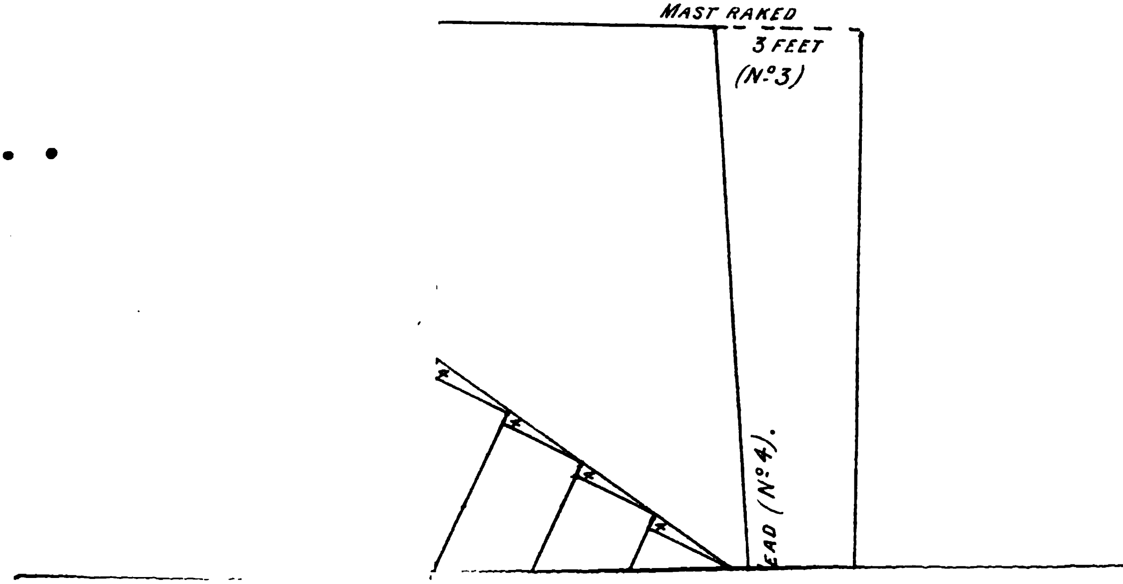
For the middle, cut 13 square cloths.

This applies to large sails.

To give the roach on the foot of this sail, three-fifths of its breadth are made parallel to the head; thus 31 cloths in the foot multiplied by 3 and divided by 5 give 18 cloths, or 9 on each side to be gored.

Base line.

The base line in this case is not the deck line, as the sail stands much higher. The 4 feet roach is measured down to the base from the middle, cut inch by inch, to drop the clews. The first gored cloth of 1 inch commences from the three-fifth breadth of foot. When the student has arrived thus far and desires a more practical and deeper insight into the art of sailmaking, I would advise him to consult Robert Kipling's "Rudimentary Treatise" on the subject. It is the best treatise I know of, and although the plans given therein are extremely small, yet with large plans like mine, and more able and detailed explanations as to different measurements, and a host of useful information, the practical painstaking officer will have added another to his many qualifications.


MAST RAKED
3 FEET
(Nº 3)
EAD (Nº 4).

CHAPTER II.

THE MOON IN NAUTICAL ASTRONOMY.

IN the October number of the *Nautical Magazine* for 1896, there appeared a very interesting article setting forth the good qualities of the moon, and how observations from this luminary could be employed to the advantage of the practical navigator. Although discussion was invited, only two entered the list—a well known ex-mail boat commander and myself. The letters that were published on the subject are lengthy ; hence I shall only confine myself to a brief outline of each and the number of the magazine, so that those who choose to look up the discussion may be able to get back numbers.

"Nautical Magazine," November.

In responding to the invitation, Captain Blackburne said : " Although I am not prepared to champion the moon as an object of observation to the same extent as Mr. Goodwin, I was pleased to see his article in last month's *Nautical Magazine*, and appreciate the value of it, in bringing into more prominent notice another string to the navigator's bow, which, I am afraid, we were all the more inclined to lose sight of and neglect owing to the remarks of our most popular author of nautical works (Captain Lecky), in his excellent book of wrinkles, " &c., &c.

December number.

In the December number the following appeared :—

THE MOON IN NAUTICAL ASTRONOMY.

" It cannot but be gratifying to find oneself substantially in agreement with a nautical expert like Captain Blackburne. In granting that the moon may be regarded as supplying another string to the navigator's bow, to be made use of as opportunity may permit, he concedes very nearly all that was claimed on her behalf. Those who would be deterred from taking moon altitudes by the necessity of making a few corrections in detail, instead of the aggregate, as in the case of the sun, probably belong to a school who trouble themselves very little about either moon or star altitudes, and may be left to the practice of the simple sun observations, still regarded by some as sufficient for all purposes," &c., &c.

For months I watched the magazine narrowly to see if other experts would tackle the subject. As none appeared, and as I also draw conclusion from this silence that moon advocates are few and far between, I took courage and entered the field ; and in the July number of 1897 my work was commented on as follows :—

" With reference to an article which appeared in the *Nautical Magazine* for October 1896, entitled ' The Position of the Moon in Nautical Astronomy,' an interesting letter has been received from Captain C. W. Brebner, of the Barque ' Grosvenor,' showing in detail the advantage which he derived from a systematic employment of the moon's altitude in determining Latitude and Longitude while engaged upon a voyage from Mauritius to Bombay early in the present year. Captain Brebner, it appears, claims to have thus made use of the moon for many years ; but, as he naively observes, ' Had I ventured to appear as a moon advocate, I should have met with much prejudice, and the work put forward would have been classed as Fancy Navigation.'

"Drawing encouragement from the paper above referred to, he now sends, in detail, results of observations taken from day to day as circumstances permitted.

"In the month of April, during the moon's third and last quarters, observations resulted as follows :—

April 23	at 5h. 32m. a.m.	Latitude by moon	16° 57′ N.
„ 24	„ 6h. 22m. „	„ „	17° 11′ N.
„ 25	„ 7h. 14m. „	„ „	17° 26′ N.
„ 26	„ 7h. 58m. „	„ „	18° 0′ N.
„ 27	„ 8h. 39m. „	„ „	18° 44′ N.

"The practical navigator will easily appreciate the advantage of thus obtaining a correct latitude early in the morning instead of waiting for a noon observation of the sun.

"The observation on the 27th, the last day on which sights were necessary, was especially valuable, firstly, because the ship having been for twenty-four hours beating up with unsteady winds, her position was very uncertain ; and, secondly, because the latitude so obtained combined with a longitude derived from an observation of the sun, made at the time, fixed the ship's position completely, and enabled a course to be at once laid for her port. A subsequent bearing of the S. W. Prongs light-house confirmed the latitude found from the moon's altitude, and showed the latitude by account to be fifteen minutes in error. It cannot but be gratifying to find the soundness of the views set forth in the pages of the *Nautical Magazine* receiving such prompt conformation from a practical source like this.

"Previous writers on the moon discredit her on account of her numerous corrections and the time it takes to complete them."

As far as I know, this is the only obstacle that caused the moon to be so much neglected.

The precision with which the Nautical Almanac has been compiled need not be taken as a factor in deterring a willing mind ; the labour to effect corrections can easily be minimized.

From the few examples I cite I hope to explain to the student how the latitude can be ascertained within five minutes after the meridian altitude is obtained and the longitude as quickly as by the sun.

LATITUDE BY THE MOON.

The rules for working a moon's meridian altitude are so simple in Norie's that I cannot do better than advise the student to religiously follow them, and his work will be easy. What I desire to point out is the great saving of time. All corrections down to the declination can be done hours or even the night before the moon's passage over the meridian.

The dead reckoning can be worked up beforehand from last position to the time of passage. In steamers, this is quite easy ; in a sailing ship, if the course and distance allowed is not made good, very few minutes will suffice to alter previous calculations. Extreme accuracy is not required in carrying the dead reckoning forward to the time of the moon's meridian passage. In correcting the declination, take the hourly difference in the Nautical Almanac from variation in 10 minutes column, set the decimal one point to the left, and you have the difference for one minute. Multiply this by minutes and seconds (Greenwich time) as in the case of the sun, and apply the corrections obtained in the usual way.

For semi-diameter and horizontal parallax take the mean between noon and midnight, or apply them direct from the Nautical Almanac as it is near to noon or midnight (Greenwich time). This is quite sufficient for practical purposes. Most valuable time is lost by these minor corrections which cause much confusion and discredit the moon, when they neither add nor take a quarter of a mile from the latitude or longitude.

Latitude in five minutes.

Having all corrections already calculated, as soon as the altitude is obtained, apply the Dip and Index Error, Semi-diameter, Refractions, and Parallax combined from Table XXX, subtract their sum from 90° for the zenith distance, apply the declination and you have your latitude within five minutes.

Barque "Grosvenor."

Long. 69° 23'
4
60) 277° 32
In time 4·37·32

1897, April 26th, a.m. at ship—Lat. by account 18° 6' N., Long. 69° 23' E.; the meridian altitude of the moon's lower limb being 62° 33' 00" S., index error 1' 21" to subtract; eye 12 feet; required the latitude.

		H.	M.			H.	M.
Moon's Mer. Pass.	25th	20	6·2	Moon's Mer. Pass.	25th	20	6·2
„ „	24th	19	22·3	Correction...		—	8·4

	H. M.			
			43·9	Pass. at ship ... 25th 19 58
Long. ...	4 37	×	4·6	equal to 7 hrs. 58m. a.m. on the 26th.
			2634	
			1756	
			2)20194	
			12)100·97	
			8·4	

	H.	M.	S.
Moon's Mer. Pass. at ship	19	58	00
Longitude in Time	4	37	32
Greenwich date ...	15	20	28
			20·5

Semi-diameter for midnight of the 25th 15' 14" H or Par. 55' 49"

"Nautical Almanac."
*** Variation in 1 min.—**
13·541
20·5
67705
270820
60)277·5905
4·37

Moon's Declination 25th at 15 hrs.* ...	8°	56'	52"S
Correction to be subtracted		4'	37"
Moon's corrected declination	8°	52'	15"S
Mer. alt. moon's lower limb	62°	33"	00"S
Dip and Index Error	—	4'	45"
App. alt. of lower limb	62°	28'	15"
Semi-diameter	+	15'	12"
Ref. and Par. (Table XXX)	+	25'	16"
	63°	8'	43"S
True altitude	90°		
Zenith Dist.	26°	51'	17"N.
Dec. corrected	8°	52'	00"S.
Latitude...	17°	59'	17"N.

LONGITUDE BY MOON.

Barque "Grosvenor."
"Nautical Almanac."
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H.	M.	S.
17	2	48·56
M. 58		9·53
S. 52		·14
	2	58·23

Var. 1 min.
10·101
58·9
90909
80808
50505
6·0) 54,9·9489
9·55

Var. 1 min.
1·9643
58· 9
176787
157144
98215
6·0) 11,5·69727
1·55·69

Table XXV

Ex. 1897, July 22nd, at 10-7 a.m. at ship.—D. R. Lat. 8° 31″ N., Long 64° 32′ 15″ E. ; time by Chronometer, July 21—17h. 56m. 4s. ; error to add 2m. 48s. Altitude of Moon's upper limb, 28° 27′ west of meridian. Eye 12 feet, Index error to subtract 1′ 21″ required the longitude.

	D.	H.	M.	S.		H.	M.	S.
Time by Chro.	21	17	56	4	Sideral time	7	58	2·84
	+		2	48				
Greenwich mean time	21	17	58	52	Acc. for 17 58 52* (H. M. S.)	+	2	58·23
			58	9	Correct sideral time ...	8	1	1·07
					Greenwich mean time.	17	58	52
					Greenwich sideral time.	25	59	52

			H. M. S.
Moon's dec. for (21d. 17h.)	18° 29′ 8″ N.	Moon's R.A...	2 7 11·15
Cor.	+ 9′ 55″	Cor.	+ 1 55·69
	18° 39′ 3″ N.		
Moon cor. dec.	90°		
Polar distance	71° 20′ 57″	Cor. R.A.	2 9 6·81

	Semi-diameter	Hor. Par.
Mean of semi-diameter and Hor. Par. between midnight of the 21st and noon of the 22nd	14′ 50″	54′ 20″

Alt. Moon's upper limb.	28° 27′ 00″
Dip and I. E. ... ...—	4′ 45″
	28° 22′ 15″
Semi-diameter ... ...—	14′ 50″
	28° 7′ 25″
Moon's Correction ...+	46′ 9″
Moon's true altitude ...	28° 53′ 34″

True altitude ...	28°	53′	34″		
Latitude	8°	31′	00″	Sec. 0·	004816
Polar distance ...	71°	20′	57″	Cosec. 0·	023426
Sum	108°	45′	31″		
½ Sum	54°	22′	46″	Cos. 9·	765191
Rem.	25°	29′	12″	Sin. 9·	633719
				Log. H. A. 9·	427152

	H.	M.	S.	
Moon's Hour Angle West	4	9	6	
,, Right Ascension	+2	9	7	
R. A. Mean Sum	6	18	13	Add 24h.
Greenwich sideral time subtract ...	25	59	53	
	4	18	20	East
Long. in Time	60		120	
	4) 258		140	
	64		35	

Minor Corrections.

In the above example the latitude was known within a trifle, having had a star in the early morning. At noon the latitude was 1½ miles north of what it should have been—that is, the true latitude was south of that employed, so that, like the sun, a correction for erroneous latitude must be applied similar to Johnson's table. Although the correction here is not great, due to having known the latitude nearly, I shall work it out as an example.

Example—

To find the error of the longitude due to an error of one mile in the latitude, turn to Norie's Table 27 A, B and C. For the Algebraic signs minus (—) and plus (+) be guided by the explanations on top of page, and also page xvii, "Explanations of Tables."

Lat. 8° N. under Moon's H. A. 4h.	Table A. gives	—	0·08′
Dec. 18°39′ N. „ „ „	„ B. „	+	0·40
Cor. or error on the Long. for error of 1′ of Lat.	... ...	+	0·32

Table C. Cor. + 0·32′ Lat. 8° N. and Moon's H. A. west of meridian gives Azimuth N. 72°5′ W., named from elevated pole, and H. A. in respect to its bearing. Now finish off as follows and just as you would with the sun, and a good observer need not be afraid to alter his course for his port if he is sure of his work.

Long. by Moon	64°	35′	00′ E.	Azimuth N. 72 W.	... 0·32
					... 1½
Cor. for Lat.	—		30 W.	S E.	... 32
					16
Long.	64°	34′	30″		0·48
Run East	+	3′	30″		
Long. by Moon at Noon	64°	38′	00″ E		
Long. by Sun	64°	36′	45″ E		

Observations taken on two nights from a known position may give those who are likely to observe the moon a certain amount of confidence. On the 28th of February 1898, whilst moored in Port Louis Harbour, with a tempting moonlight night, two observations were made at 8·10 and 8·25 P.M., respectively, for longitude. The result of the former was 57° 35′ 15″ and that of the latter 57° 34′ 00″ E., the floating light vessel bearing nearly North true and in Longitude 57° 29′ E. Surely this is near enough to satisfy the most fastidious, especially when we take into consideration that these results were obtained from a single altitude by one of Henry Hughes & Son's star telescopes. A sextant fitted with a tiny incandescent lamp, as recommended by Captain Lecky, would be of great utility to moon observers in obtaining a set of altitudes in quick succession at night.

Captain Blackburne mentions, when the moon is to be seen during the day, it would often be much better in the winter months in high latitudes to observe her for longitude in preference to the sun, as she could often be observed when on or near the prime vertical, when errors of altitude and latitude would make least error in the longitude.

To Mr. Goodwin, R.N., is due the credit of reviving this much-discredited nautical problem, and also to a practical navigator like Captain Blackburne for what he has claimed on her behalf.

PRESS OPINIONS AND LETTERS RECEIVED.

From H. B. Goodwin, Esq., M.A., R.N.

Dear Sir,

Please accept my best thanks for the very interesting volume you have been so kind as to send me. I feel much flattered by the notice of the *Nautical Magazine* letters in the last chapters. From recent correspondence in the *Nautical Magazine* by Mr. Plumstead, I think the party of the Moon has been gaining converts lately.

* * * * * *

There is one part of your work which interests me greatly—that about Cyclones. Your unique experience of fifteen years' continual voyaging between Mauritius and Bombay enables you to speak with an authority which few could claim. The table which gives distance of centre from height to rate of fall of barometer seems to me to be particularly valuable.

* * * * * *

Trusting your work may meet with all the success which it deserves.

From Admiral W. R. Kennedy,

Late Commander-in-Chief in the East Indies.

Dear Captain Brebner,

I received your copy of the New Indian Ocean Handbook a few days ago, and now write to thank you for it and for remembering me.

I have read the book with very great interest. It contains a great deal of information which will be of use to Mariners in those seas, besides other interesting and useful matter compiled from your long experience as a Navigator.

I well remember the *Sir Lancelot*, in what beautiful order she was and what splendid passages you made in her, showing your intimate knowledge of the winds and currents of the Indian Ocean, combined with seamanship of a high order.

I see by your book that the *Sir Lancelot* was lost as soon as the guiding hand left her.

Wishing you success in the *Grosvenor*.

The New Handbook for the Indian Ocean.—By Capt. C. W. Brebner.—(Bombay : " Times of India " Press).—Captain Brebner, of Mauritius, late master of the ex-China tea clipper *Sir Lancelot*, and now in command of the barque *Grosvenor*, trading direct between Bombay and Mauritius, says in the preface to his work that he has compiled it with the sole object of offering his experience of service to those who have not navigated the Indian Ocean the number of years he has done. For the past fifteen years he has carefully studied the various phenomena which precede, accompany, and follow cyclones and currents, and he thinks his experience may be the means of assisting his colleagues to meet such storms, &c., well prepared, or better still, of enabling them to avoid those storms. The work also deals with miscellaneous subject for sail and steam, sailmaking, &c., and altogether the work is one likely to be of great service to masters navigating Eastern waters.—*Fairplay.*

New Handbook for the Indian Ocean, Arabian Sea and Bay of Bengal. By C. W. Brebner, late Master, ex China Tea Clipper *Sir Lancelot*, Bombay. Printed at the *Times of India Press.* 1898.

This is in many respects a very remarkable book. Besides giving a complete system of sailing directions for the principal ports of the North and South Indian Oceans, it contains a mass of highly important information upon the cyclones which form such a terrible feature in the meteorology of that portion of the globe, and many of the details upon this subject are now published, in English at all events, for the first time. In the words of the author, "This chapter is based on my own personal experience, Dr. Meldrum's advice, and translations from Capitaine Bridet's work on Cyclones." The name of Meldrum is well known in connection with the theory of cyclonic storms, but the researches of M. Bridet, though carrying great weight amongst his compatriots, has hitherto received but little attention in this country.

M. Bridet was a lieutenant in the French navy, who was wrecked on the coast of Mozambique in 1858. He afterwards became "Capitaine de Port" at St. Denis, Réunion Island, and after holding that post for a quarter of a century died three years since. During that time he devoted himself to the study of cyclones, and was for his services in this direction promoted to the rank of "Capitaine de Frégate."

The Bridet Tables enable an approximate estimate to be formed of the distance of the centre of a circular storm, as deduced from the height of the barometer and the rate of fall per hour, and such tables naturally are of the highest interest for seamen, especially when illustrated by the experience of practical navigators, as was the case with the author when in command of the *Sir Lancelot.*

A curious feature of the South Indian cyclones brought out by Captain Brebner is the extraordinary increase in their number during recent years. In the year 1889 no cyclones were recorded. In 1890 there were three small storms; in 1891 four of longer duration; while in 1892 the number rose to nine, some of which were very severe and destructive. That which took place on April 29, 1892, was unprecedented in violence. At Port Louis, Mauritius, during a short space of time 1,200 persons were killed and 2,000 wounded, while one-third of the houses were blown down and 20,000 persons rendered homeless.

One very important effect of the cyclones, well set forth by the author, is the derangement of the ordinary ocean currents often experienced, after a more than usually severe storm. A very marked instance occurred in the case of the ship *Northern Light* on her passage from Mauritius towards the Cape. For the first three days the effect of the currents, though variable, was not particularly marked, but on the fourth day out a set of eighty-four miles to the north took place, followed by a southward set of equal amount on the following day, the ship being some 300 miles to the south-east of Madagascar at the time. The current then resumed its normal flow, the exceptional variation in direction being afterwards found to be due to a cyclonic disturbance which had taken place in the locality a day or two previously. A chartlet showing the effect of the current upon the position of the *Northern Light* is given in the book.

The name of Brebner will perhaps not be wholly unfamiliar to readers of this magazine. Some years back when the subject of the suitability of the moon for general observation at sea was discussed in these columns, Captain Brebner, then as now commanding the barque *Grosvenor*, trading between Mauritius and India, came forward as an enthusiastic supporter of our satellite for general use in finding ship's position, and backed up his opinion by a series of observations taken on a recent voyage. It would appear that the gallant captain is in no way shaken in the faith which he then possessed, for he devotes his concluding chapter to the "Moon in Nautical Astronomy," giving types of observations both for latitude and longitude together with certain extracts from the correspondence published in the *Nautical Magazine.*

A copy of this handbook should find a place in the chart box of every vessel navigating the Indian Ocean, and in every library which numbers amongst its readers persons in any way interested in seafaring matters.—*Nautical Magazine.*

In the course of a long and appreciative review of this "Handbook," the *Times of India* remarks:—Captain C. W. Brebner, a master mariner who is well known in Bombay, has just published a "New Handbook for the Indian Ocean, Arabian Sea, and Bay of Bengal." Captain Brebner has been constantly engaged in navigating the Indian Ocean for the last fifteen years, and he still commands the barque *Grosvenor*, the only sailing vessel now running regularly between Bombay and Mauritius. His book, a neat little volume of about two hundred pages, is primarily intended to afford some help to those of his brother navigators who are less familiar than himself with the Indian Ocean. It contains in a condensed form the sailing directions for various ports, compiled from the publications of several standard authorities, to which are added the results of his own personal experience. A large amount of information regarding various harbours is also included, together with summaries of quarantine and traffic regulations, and details upon other technical points of interest to seafarers. The important topic of cyclones—the terror of mariners in these seas—is dealt with at considerable length, and with much insight and exact knowledge. Captain Brebner states that he has for years closely studied the phenomena accompanying cyclones and currents in the Indian Ocean, and he is therefore able to speak with authority upon the subject.

To the layman, as well as to the sailor, the less technical portions of the volume should prove extremely interesting. The author has a good deal to say about the history and topography of Mauritius, Réunion, the Seychelles, and various other places in the Indian Ocean and on the coasts of India. His work is, in some respects, quite a mine of curious records and stories. Not the least valuable portion is that which treats of notable wrecks which have taken place in Indian waters during the present century....Captain Brebner devotes a chapter to Captain Joshua Slocum, the hardy Boston navigator who has sailed round the world alone....His chapters on sailmaking, entitled "Every Officer his own Sailmaker," are interesting, and are evidently the product of much practical knowledge. It will not be forgotten in Bombay that Captain Brebner formerly commanded the old China tea clipper the *Sir Lancelot*, the fastest of the tea clippers, and at one time the fastest sailing ship in the world....The "Handbook" is illustrated by numerous reproductions of photographs, and also contains a number of maps and plans. A view of Port Louis Harbour, taken by moonlight from a hill behind the town, is the most unique example of moonlight photography ever brought to our notice.

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